History and Current Status of SZ-South Remedy

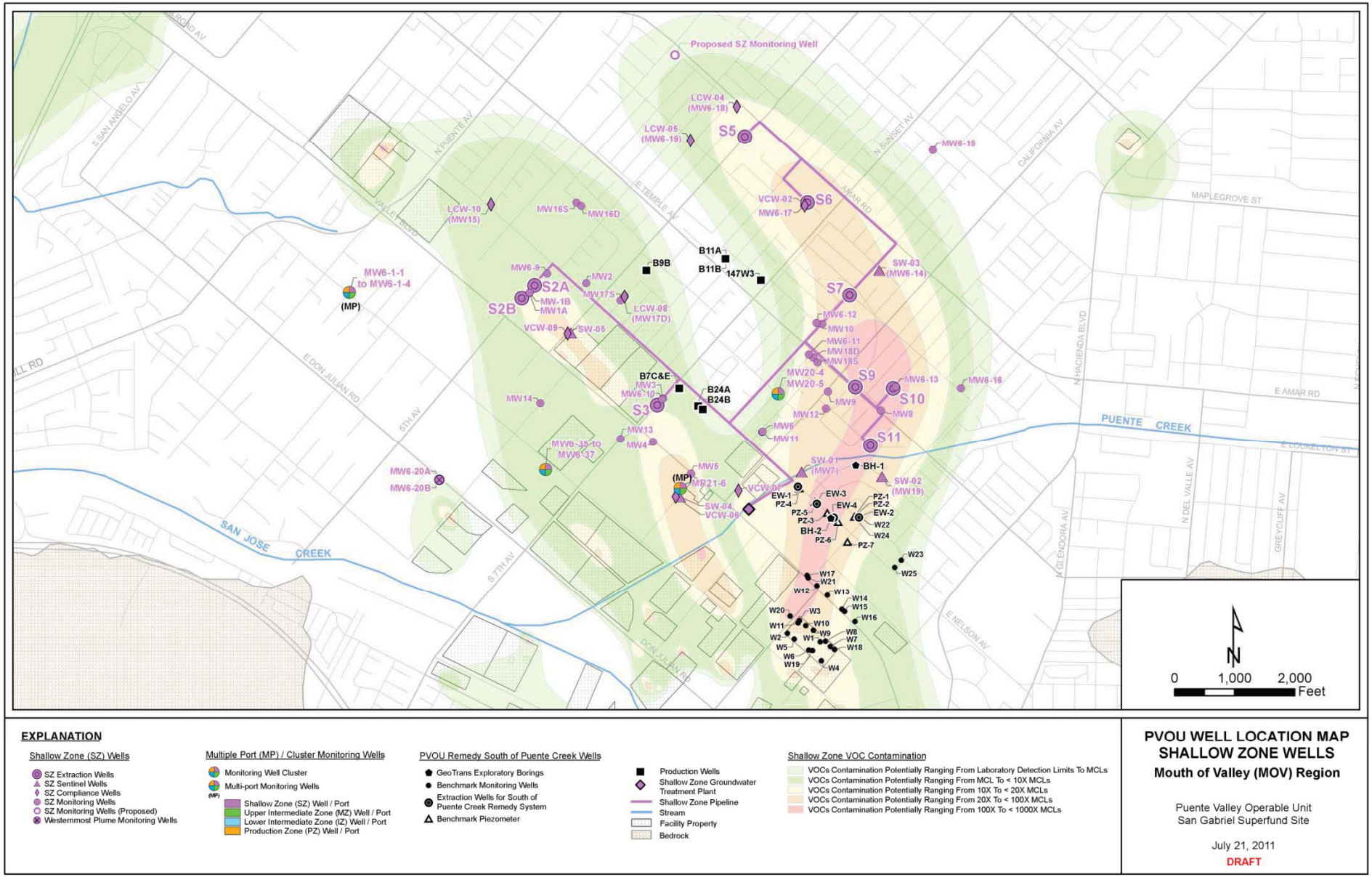
CDM Smith Irvine office

31 January 2012

Remedial Objectives

Remediate groundwater attributable to the Benchmark source areas:

- Impacted by volatile organic compounds (VOCs) and 1,4-dioxane
- Present within the Shallow Zone (SZ)
- Located between the former TRW Benchmark site and Puente Creek



EXPLANATION

Shallow Zone (SZ) Wells
- SZ Extraction Wells
- SZ Sentinel Wells
- SZ Compliance Wells
- SZ Monitoring Wells
- SZ Monitoring Wells (Proposed)
- Westernmost Plume Monitoring Wells

Multiple Port (MP) / Cluster Monitoring Wells
- Monitoring Well Cluster
- Multi-port Monitoring Wells (MP)
- Shallow Zone (SZ) Well / Port
- Upper Intermediate Zone (MZ) Well / Port
- Lower Intermediate Zone (IZ) Well / Port
- Production Zone (PZ) Well / Port

PVOU Remedy South of Puente Creek Wells
- GeoTrans Exploratory Borings
- Benchmark Monitoring Wells
- Extraction Wells for South of Puente Creek Remedy System
- Benchmark Piezometer

- Production Wells
- Shallow Zone Groundwater Treatment Plant
- Shallow Zone Pipeline
- Stream
- Facility Property
- Bedrock

Shallow Zone VOC Contamination
- VOCs Contamination Potentially Ranging From Laboratory Detection Limits To MCLs
- VOCs Contamination Potentially Ranging From MCL To < 10X MCLs
- VOCs Contamination Potentially Ranging From 10X To < 20X MCLs
- VOCs Contamination Potentially Ranging From 20X To < 100X MCLs
- VOCs Contamination Potentially Ranging From 100X To < 1000X MCLs

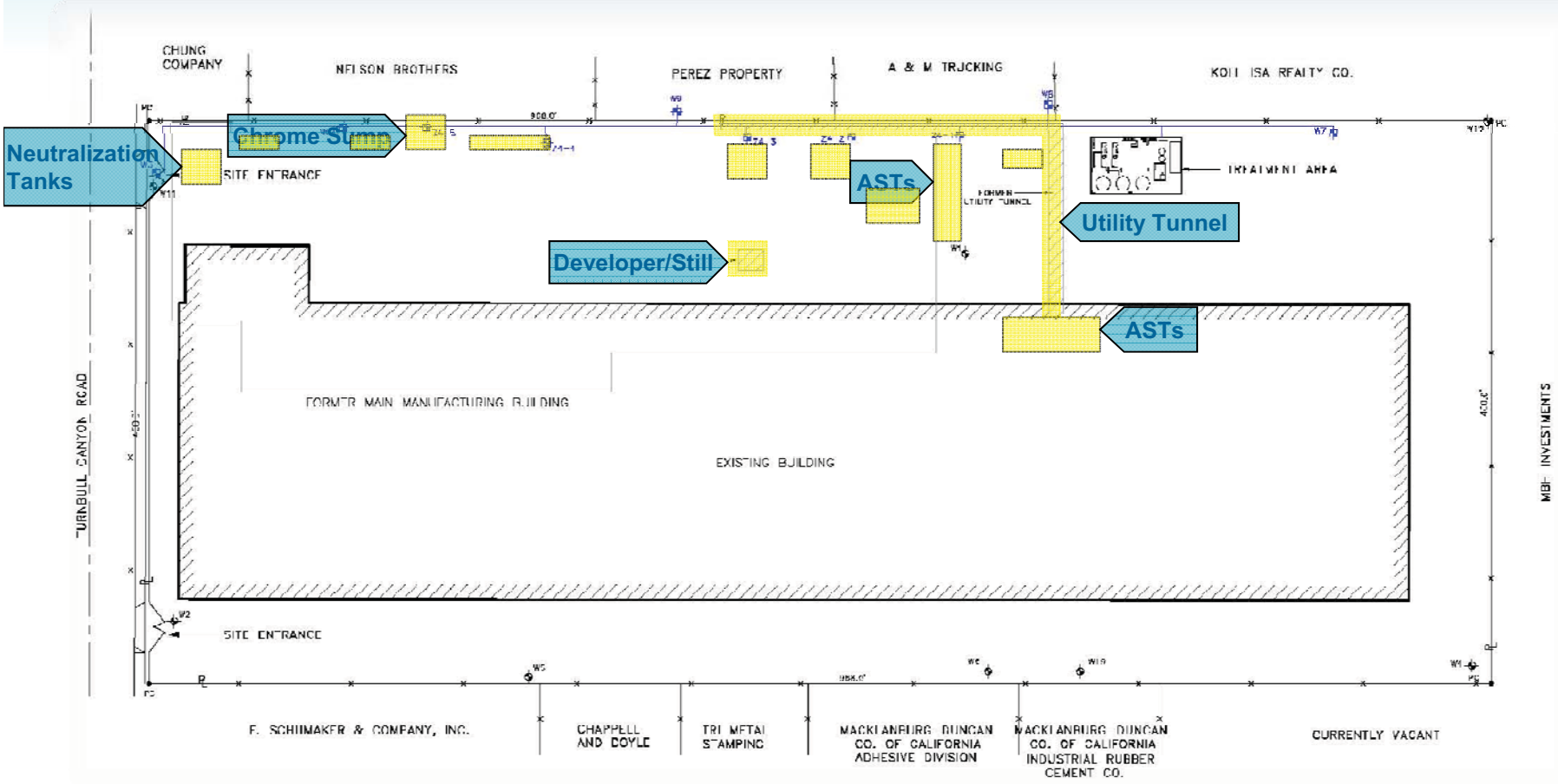
PVOU WELL LOCATION MAP
SHALLOW ZONE WELLS
Mouth of Valley (MOV) Region

Puente Valley Operable Unit
San Gabriel Superfund Site

July 21, 2011

DRAFT

Site Plan and Former Source Areas

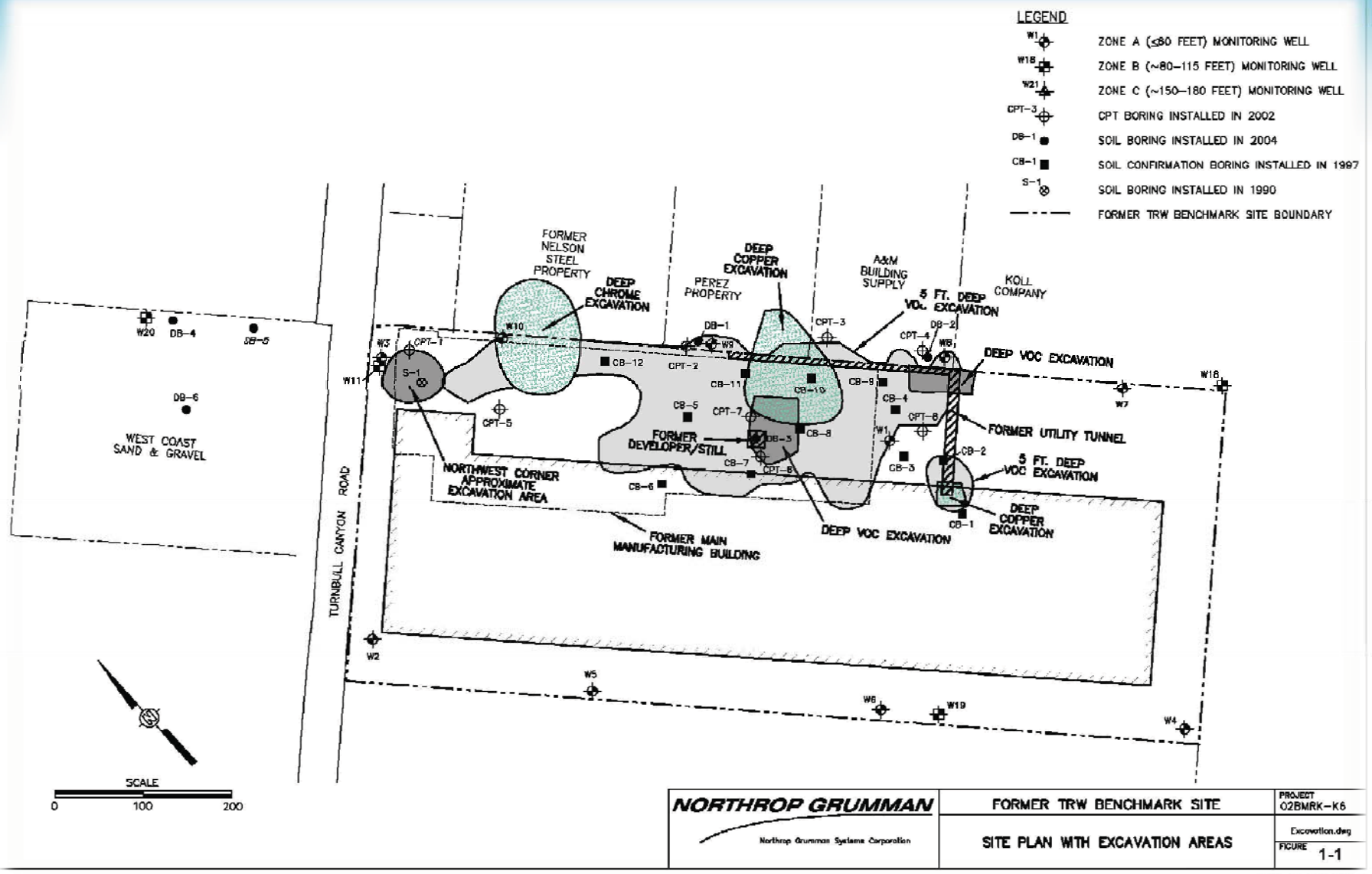


Site Remediation History

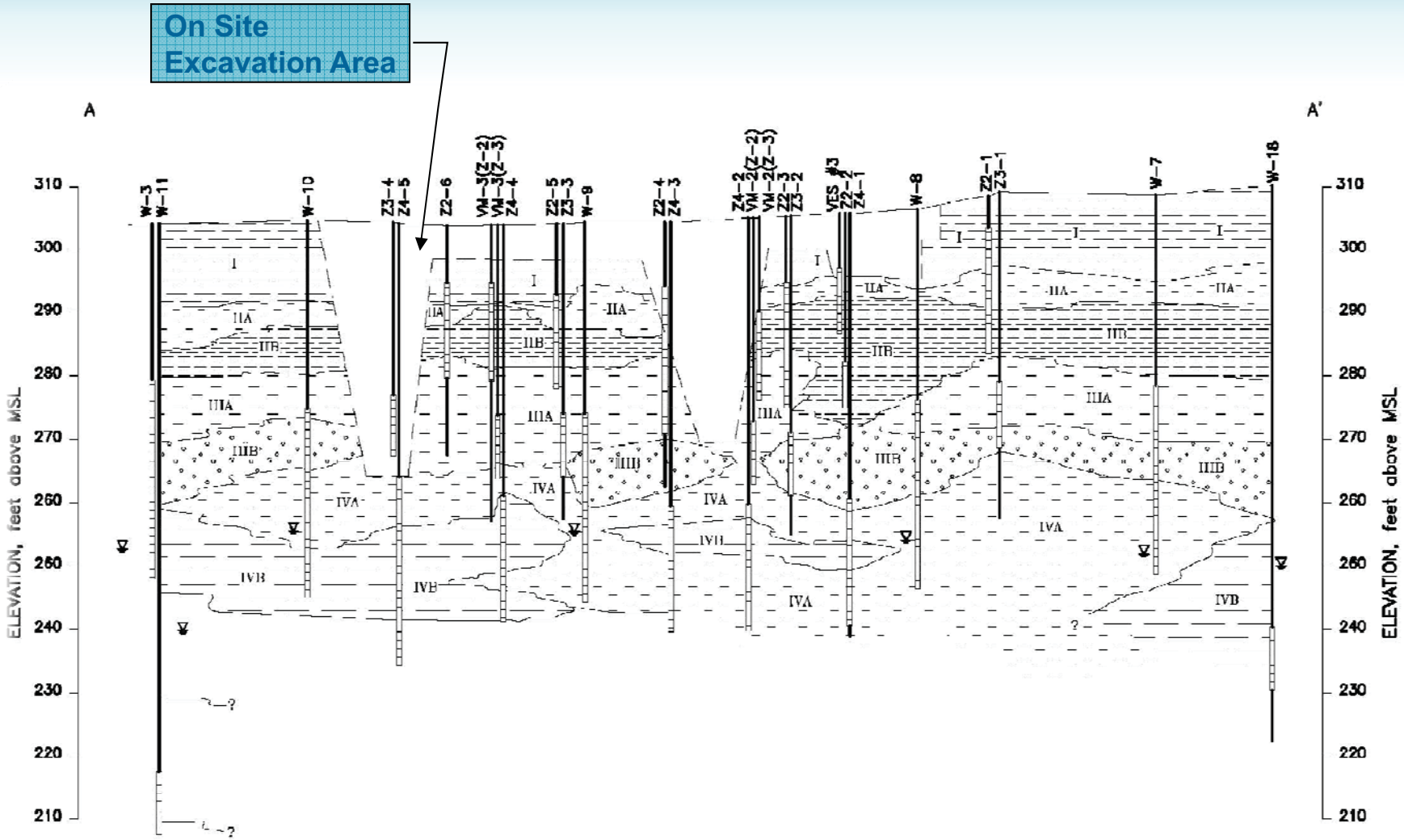
- 1987 to 1990 – Site investigation activities
  - 75 soil gas probes, 100 soil borings, and 16 groundwater wells
- 1990 to 1992 – Onsite buildings demolished and highest impacted soils excavated from 5 to 45 feet below grade
  - 2,900 cubic yards (CY) of chromium-impacted and 3,700 CY of copper-impacted soil excavated for offsite disposal
  - 14,000 CY of VOC-impacted soil excavated and treated on site for backfill and site redevelopment (4.5 months of SVE; 427 lbs removed)
- 1992 to 2007 – In situ soil remediation (SVE)
  - 34 vapor extraction wells connected to blowers capable of extracting approximately 800 cubic feet per minute
  - RWQCB soil closure in September 1998; continued operation to remove mass exposed during varying water table
  - Removed approximately 9,196 lbs of VOCs
- 1996 to 2004 – Groundwater extraction and treatment system
  - 10 extraction wells; removed approx. 40 million gallons of groundwater and 428 lbs of VOCs (2004 to 2008 operation was intermittent)

Source Area Remediation

Soil Excavations



Vadose Zone Section (Excavations and SVE System)



DTSC Data Request

- ***Request No. 1*** *- The northwest corner of Site (near entrance) where VOC contamination was removed deeper > 20' bgs. Confirmation soil samples for both lateral and vertical extent including any GW sampling done beneath contaminated areas.*
  - Soil excavation in northwest corner at the location of a reported former wastewater treatment area, confirmation sampling data not available
  - Boring S-1 drilled at this location in early 1990 before excavation

Boring	Depth (feet below grade)	1,1,1-TCA[a] (µg/kg)	1,1-DCE[a] (µg/kg)	TCE[a] (µg/kg)
S-1	15	ND	ND	ND
	30	ND	ND	ND
	40	ND	ND	19

(a) 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethene (1,1-DCE), and trichloroethene (TCE) reported as micrograms per kilogram (µg/kg).

  - Well W3 located adjacent to the former excavation area screened from 25 to 55 feet below grade.

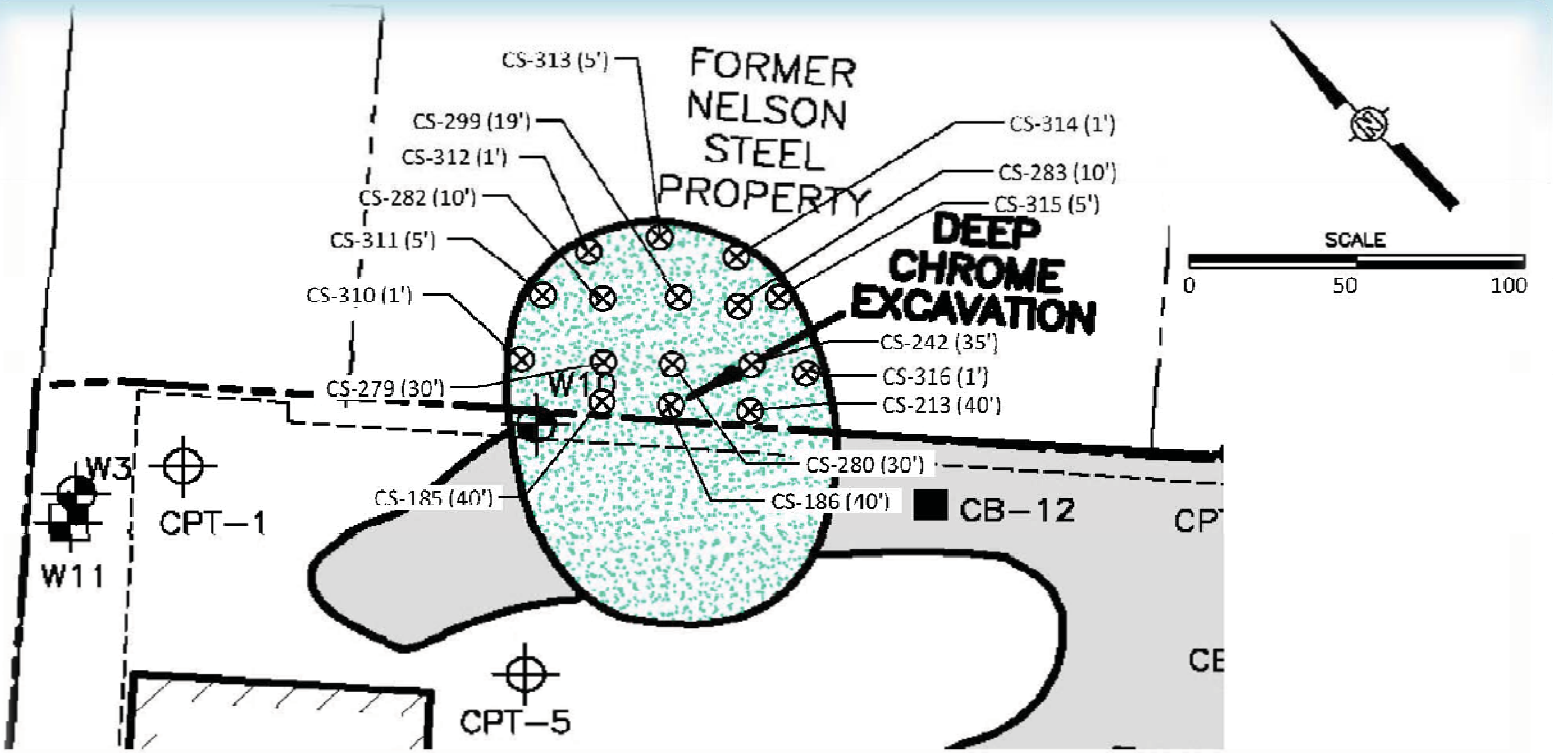
Well	Sample Date	1,1,1-TCA[a] (µg/l)	1,1-DCE (µg/l)	TCE (µg/l)
W3	11/1/91	120,000	22,000	73,000
	6/20/11	57	27	330

(a) Reported in micrograms per liter (µg/l).

DTSC Data Request

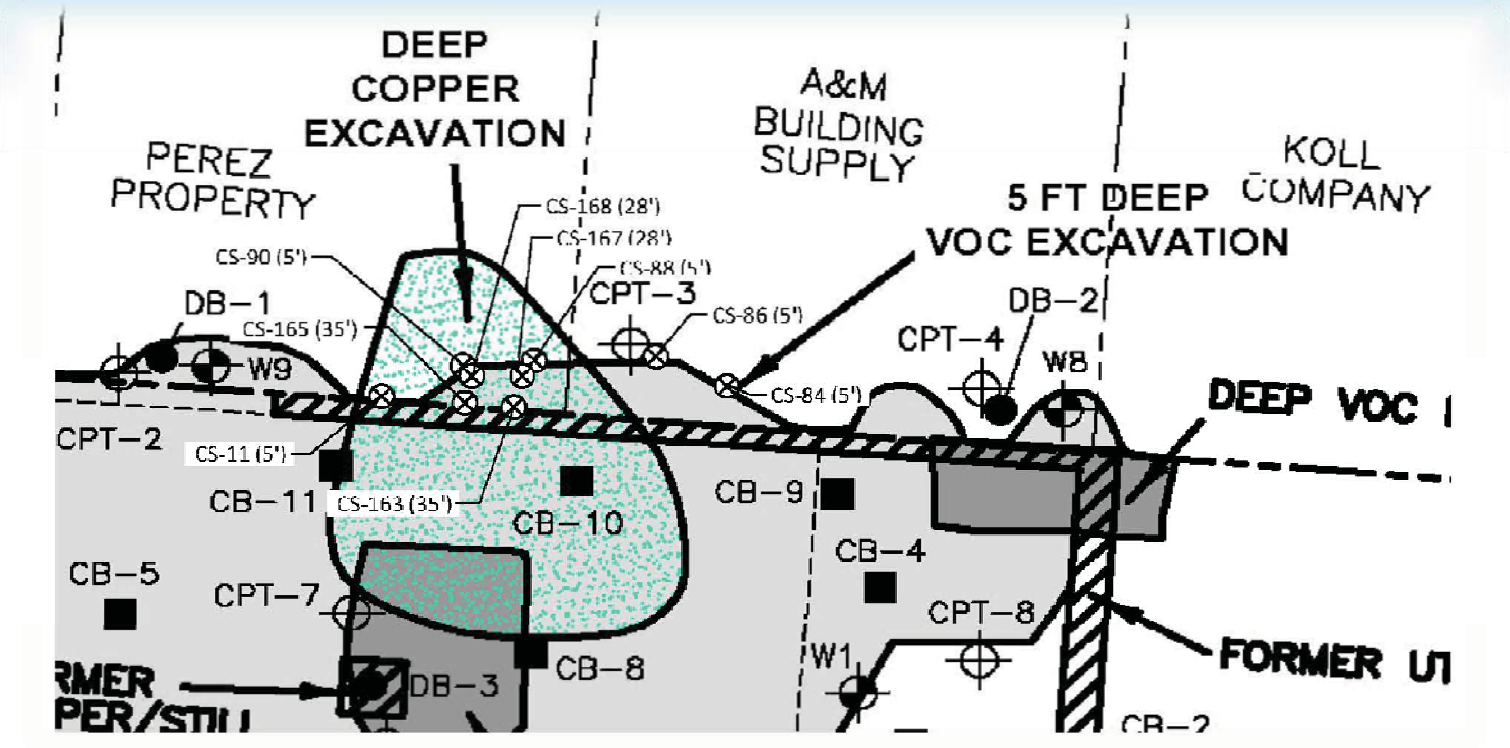
- ***Request No. 2*** *- Northern boundary of Site bordering adjacent business where soil removal actions encroached/entered other properties. Soil and GW confirmation data is requested.*
  - *Soil remediation by excavation extended to northern properties to meet remediation cleanup goals in 1990 and 1991*
  - *Over 20,000 cubic yards of soil was removed*
  - *Soil confirmation samples were collected from sidewalls and floors of excavations.*

DTSC Data Request
Soil Excavations: Chromium



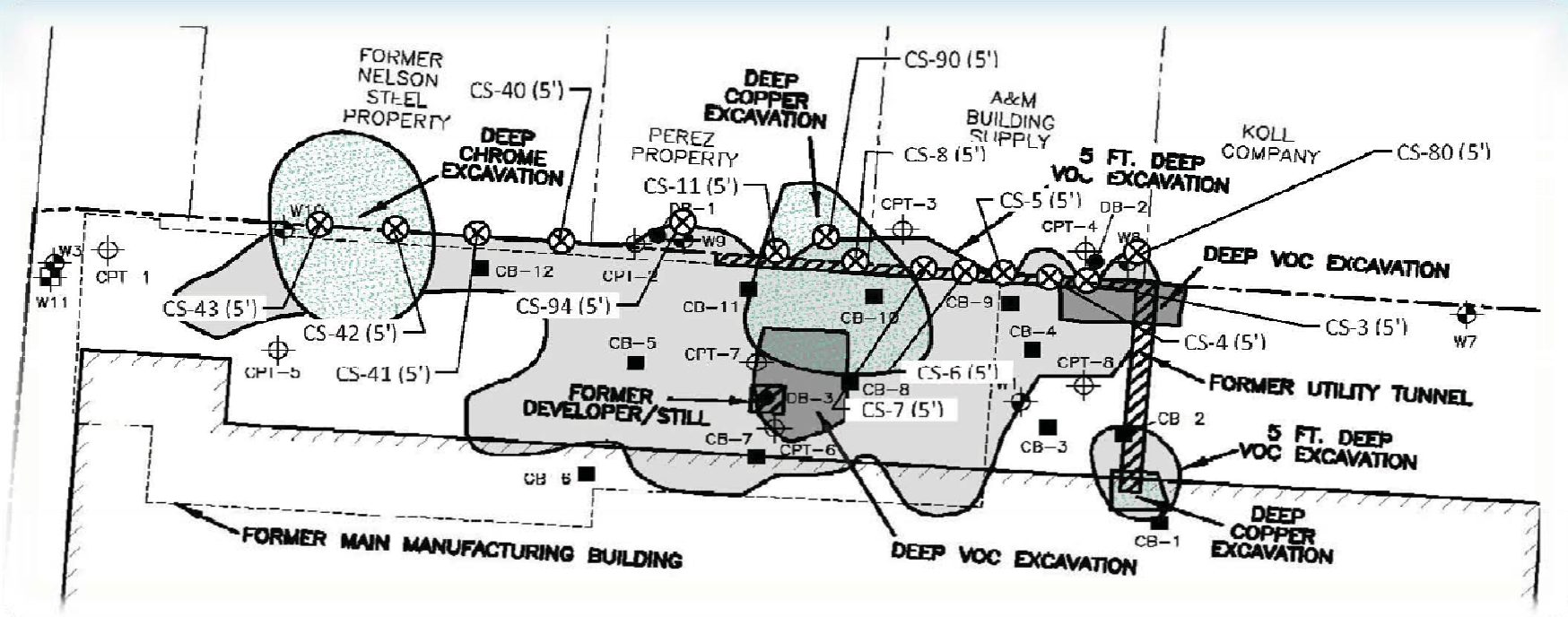
- Chromium excavation extended on to northern adjacent property to a depth of 45 feet below grade
- At least 16 samples were collected from sidewalls and floor to confirm chromium concentrations below remedial objective of 100 mg/kg.

DTSC Data Request
Soil Excavations: Copper



- Copper excavation extended on to northern adjacent property to a depth of 35 feet below grade
- Total of 13 samples were collected from 28 to 35 feet below grade to confirm copper concentrations below remedial objective of 100 mg/kg.

DTSC Data Request
Soil Excavations: VOCs



- Shallow VOC excavation extended on to northern adjacent property in two areas
- Total of 13 samples were collected along the sidewall to confirm VOC concentrations below remedial objective of 100 μg/kg.

DTSC Data Request

- Soil vapor extraction and groundwater extraction systems were installed in 1992 and 1996, respectively, to remediate remaining impacts following excavation

- Groundwater extraction wells were installed along the northern property boundary (W10) and on adjacent properties (W8 and W9)

Well	Sample Date	1,1,1-TCA (µg/l)	1,1-DCE (µg/l)	TCE (µg/l)
W8	10/1/90	35,000	24,000	3,500
	6/21/11	4,500	2,300	67
W9	11/1/91	1,600	56,000	13,000
	6/21/11	19	14	3.7
W10	11/1/91	400	7,000	3,600
	6/16/11	1.6	12	29

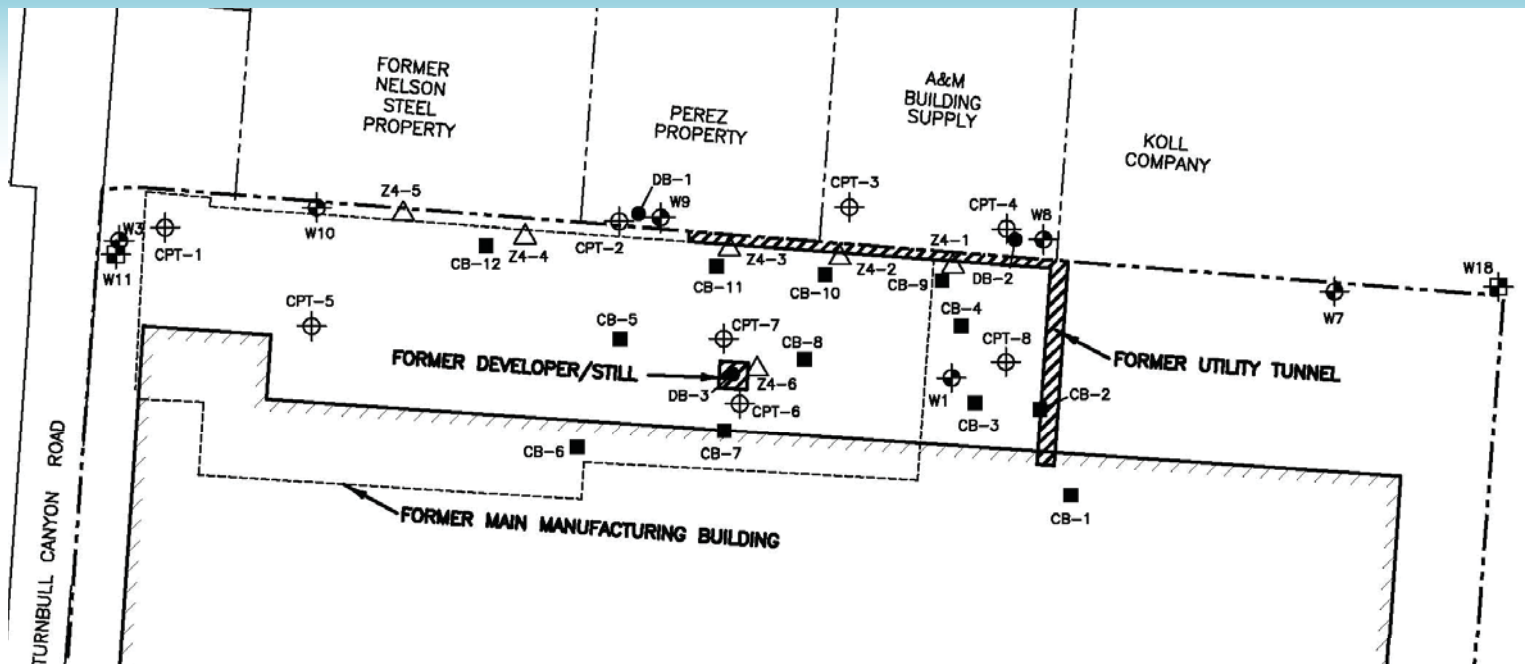
- Vapor monitoring points were installed in the adjacent properties (VM-5, VM-6, and VM-7).

Vapor Monitoring Well	Sample Date	1,1,1-TCA (µg/l)	1,1-DCE (µg/l)	TCE (µg/l)
VM-5	Aug 1993	ND	11.2	1.9
	June 1997	ND	ND	ND
VM-6	Aug 1993	100.0	504.6	66.1
	June 1997	ND	5.0	ND
VM-7	Aug 1993	22.2	586.7	34.1
	June 1997	ND	3.0	ND

DTSC Data Request

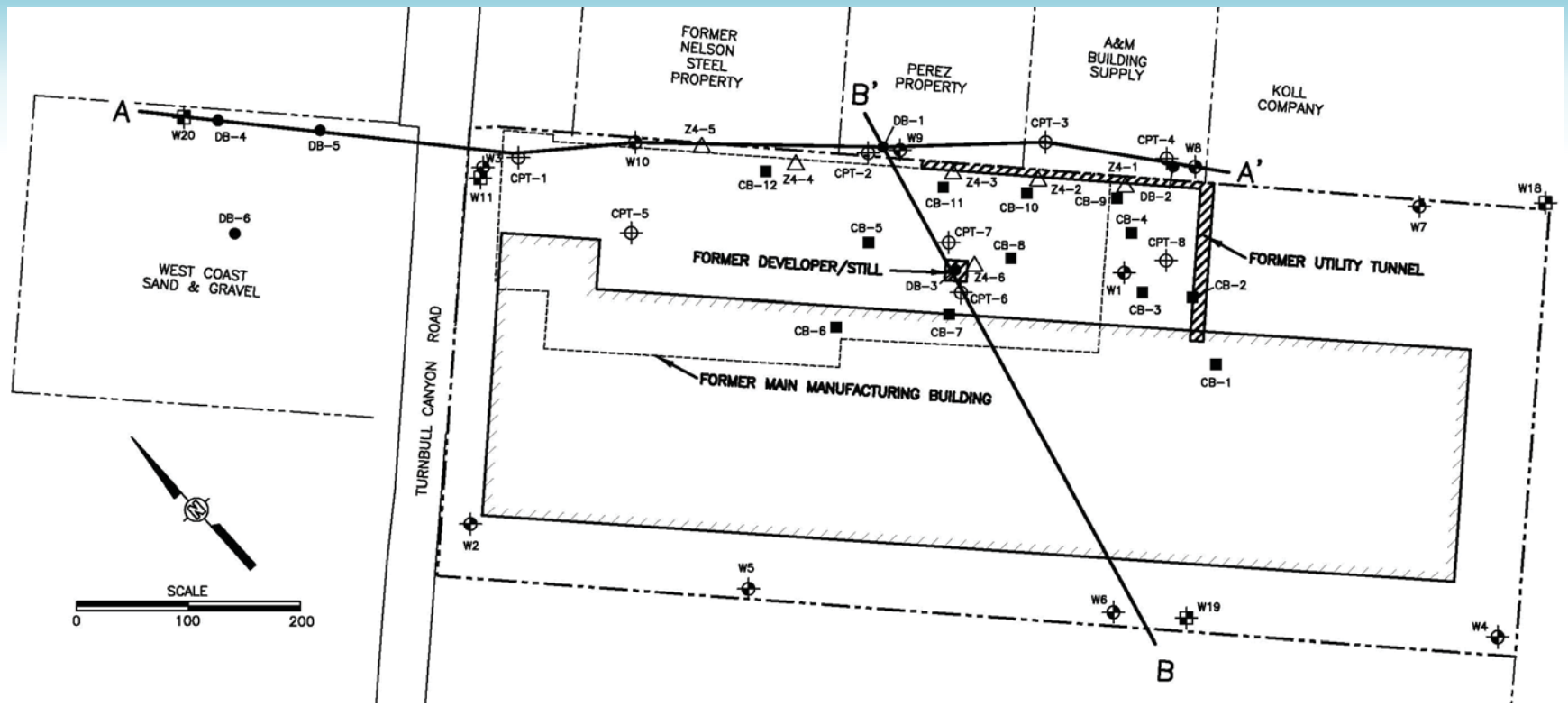
- ***Request No. 3*** *- Soil boring results taken from areas beneath Benchmark showing saturated zone contamination as well as up-gradient and down-gradient GW and soil matrix conditions.*
  - Soil and groundwater investigations were conducted after excavation activities in 1992 and after 5 to 8 years of operation of the SVE and groundwater extraction systems
    - Soil confirmation sampling in 1997
    - Deep source area investigation in 2002
    - Deep soil boring investigation in 2004

DTSC Data Request
Soil Confirmation Sampling



- In 1997, 12 confirmation soil borings (CB-1 to CB-12) drilled and sampled at 5-foot intervals to depths of 20 to 31 feet below grade
- VOCs concentrations were below laboratory detection limits in 29 of 31 samples analyzed
- CB-7-25 (25 feet below grade) and CB-10-20 (20 feet below grade) only samples to contain detectable TCE at 22 and 8.8 μg/kg, respectively.

DTSC Data Request
Deep Source Area Investigation

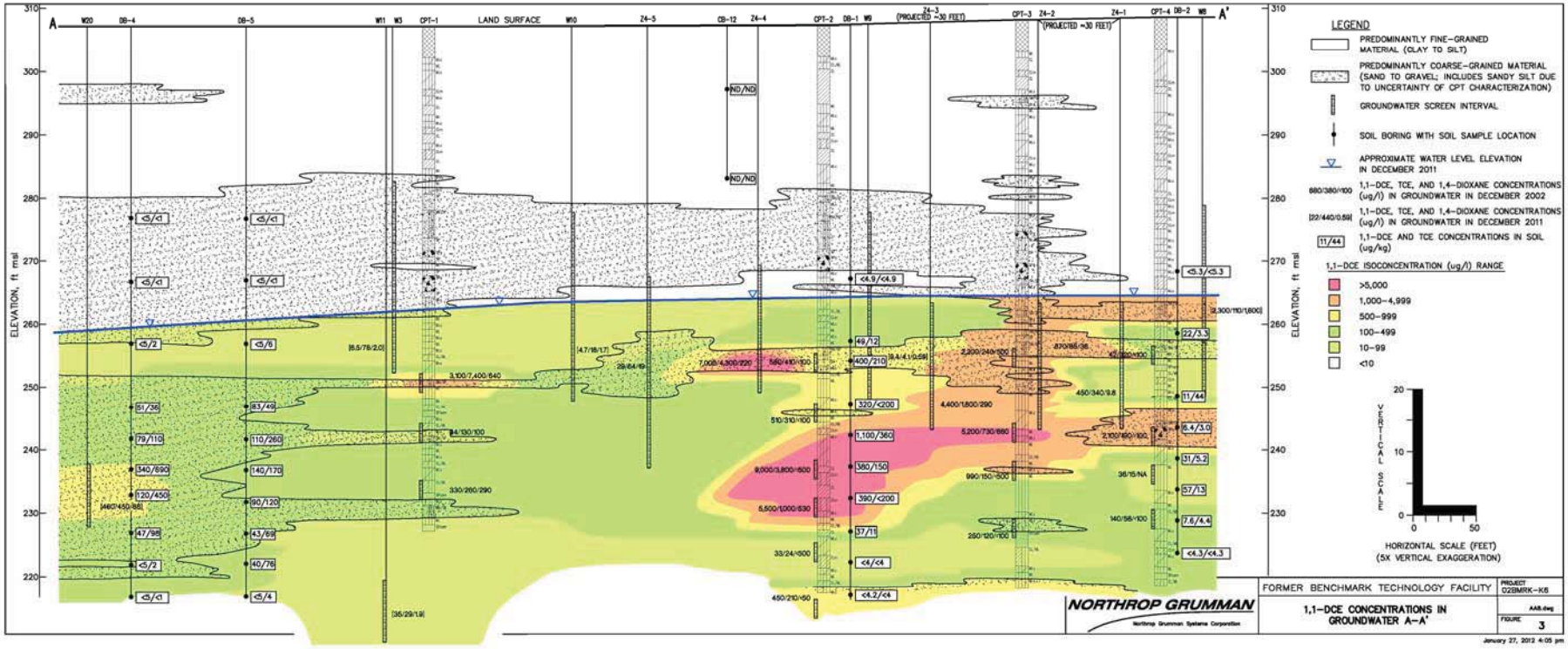


- Eight borings drilled with CPT in 2002 to depths of 75 to 94 feet below grade
- Highest TCE concentration (7,400 μg/l) at CPT-1, within 35 feet of well W3, at a depth of 55 to 58 feet below grade
- Highest 1,1-DCE concentration (17,000 μg/l) at CPT-6, located near former developer/still source area, at a depth of 73 to 76 feet below grade

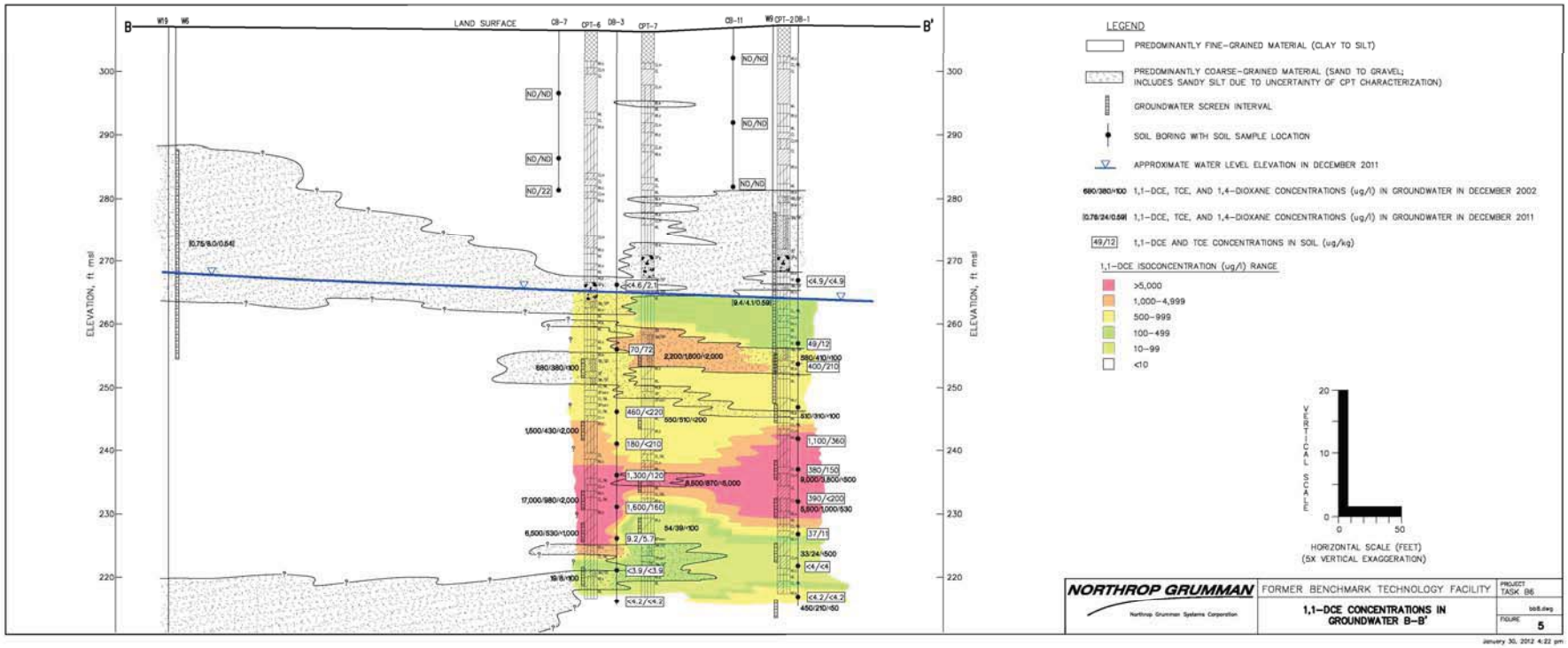
DTSC Data Request
Deep Soil Boring Investigation

- Six soil borings drilled using a sonic rig in 2004 to depths of 105 to 115 feet below grade to assess saturated soil impacts near former source areas and between the site and offsite well W20
- Highest TCE concentration (690 μg/kg) at DB-4, adjacent to well W20, at a depth of 70 feet below grade
- Concentrations were lower at DB-5 and DB-6 located between DB-4 and the site
- Highest 1,1-DCE concentration (1,600 μg/kg) at DB-3, located near former developer/still source area, at a depth of 75 feet below grade.

DTSC Data Request
Deep Source Area Investigation



DTSC Data Request
Deep Source Area Investigation

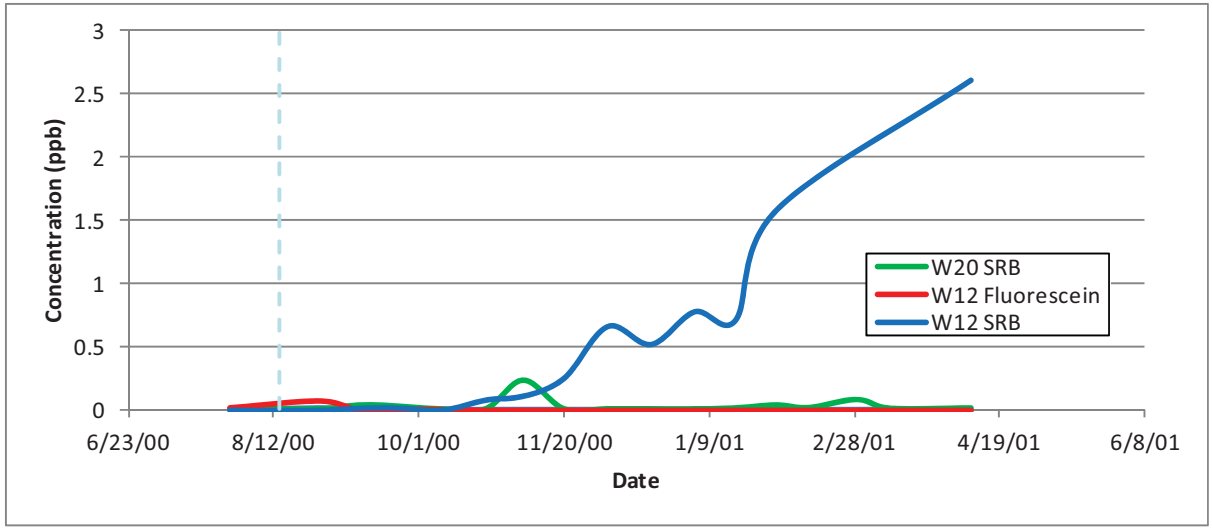


DTSC Data Request

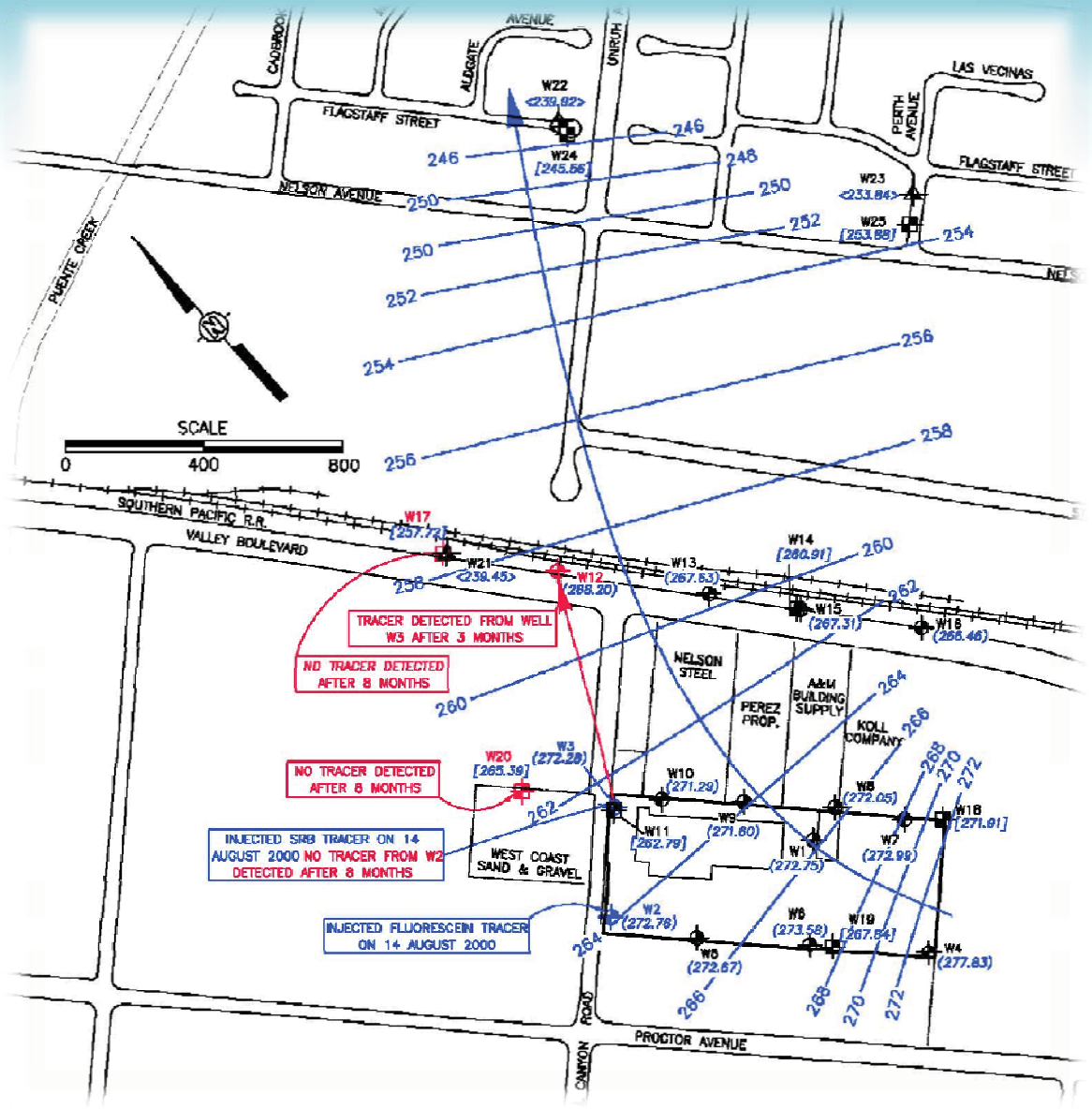
- ***Request No. 4*** *- The Utility Tunnel was a known source area of VOCs and 1,4-dioxane yet there was not a lot of information available to determine which remedial actions were taken to eliminate this source. Please include all GW and soil matrix data.*
  - The former utility tunnel was removed during demolition activities in 1990 and soil with individual VOC concentrations greater than 1,000 μg/kg were excavated to a depth of 14 to 15 feet below grade in 1991
  - Total of 10 confirmation samples were collected and all contained less than 1,000 μg/kg of any individual VOC
  - Remaining VOC-impacted soil remediated by SVE system which included 30 vertical and 4 horizontal extraction wells within and around the utility tunnel
  - Groundwater beneath the utility tunnel was remediated by a groundwater extraction system.

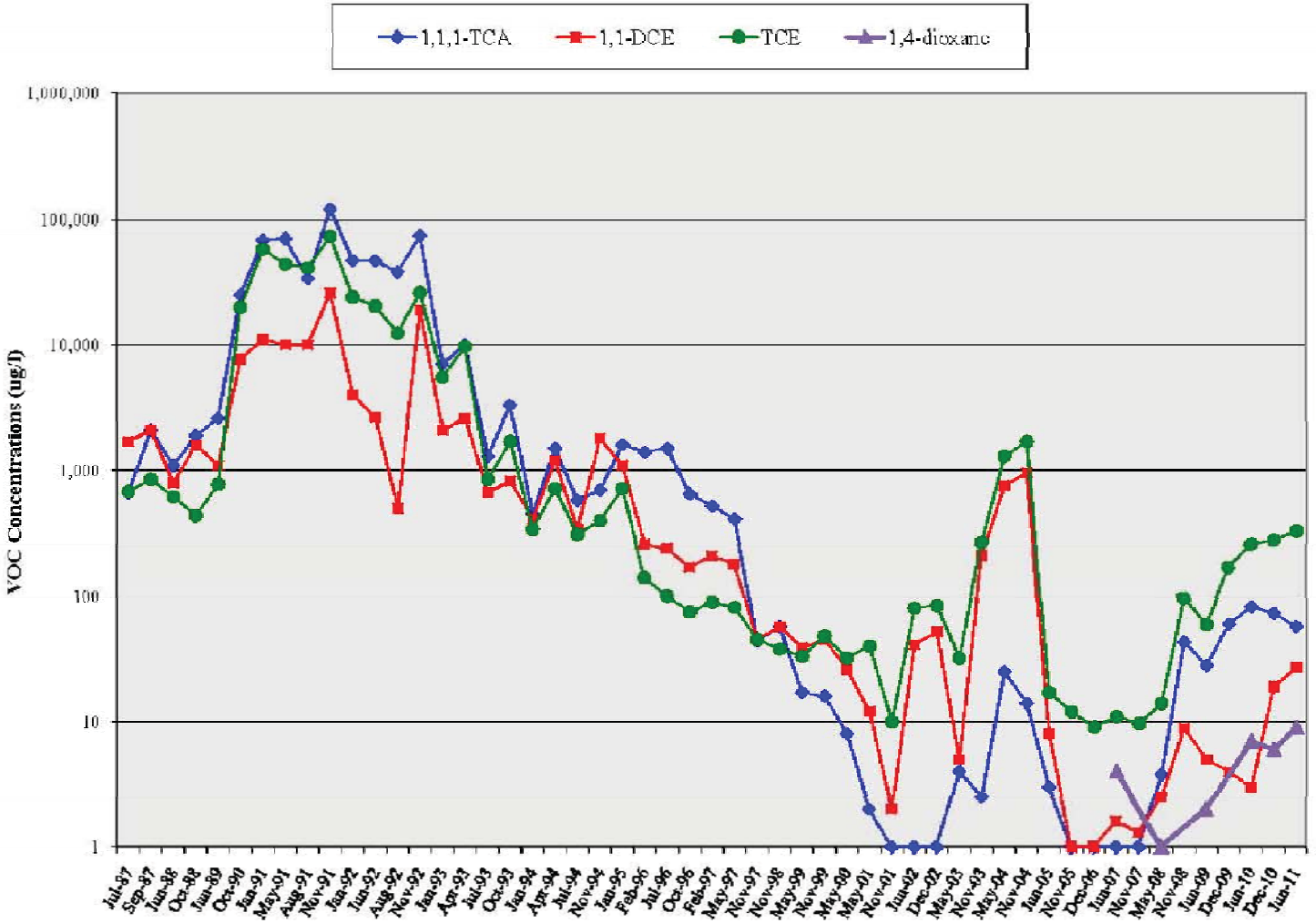
DTSC Data Request

- ***Request No. 5*** *- Information on tracer tests conducted at various Benchmark wells to help determine flow regimes beneath the Site.*
  - From August 2000 to April 2001, a dye tracer test was performed to evaluate groundwater flow paths in the western area of the site
  - Dye tracer injected in wells W2 and W3 and monitored in wells W3, W12, W17, and W20
  - Dye tracer from W3 detected in well W12, roughly 700 feet downgradient, after 98 days
  - Dye tracer not detected in any other wells.

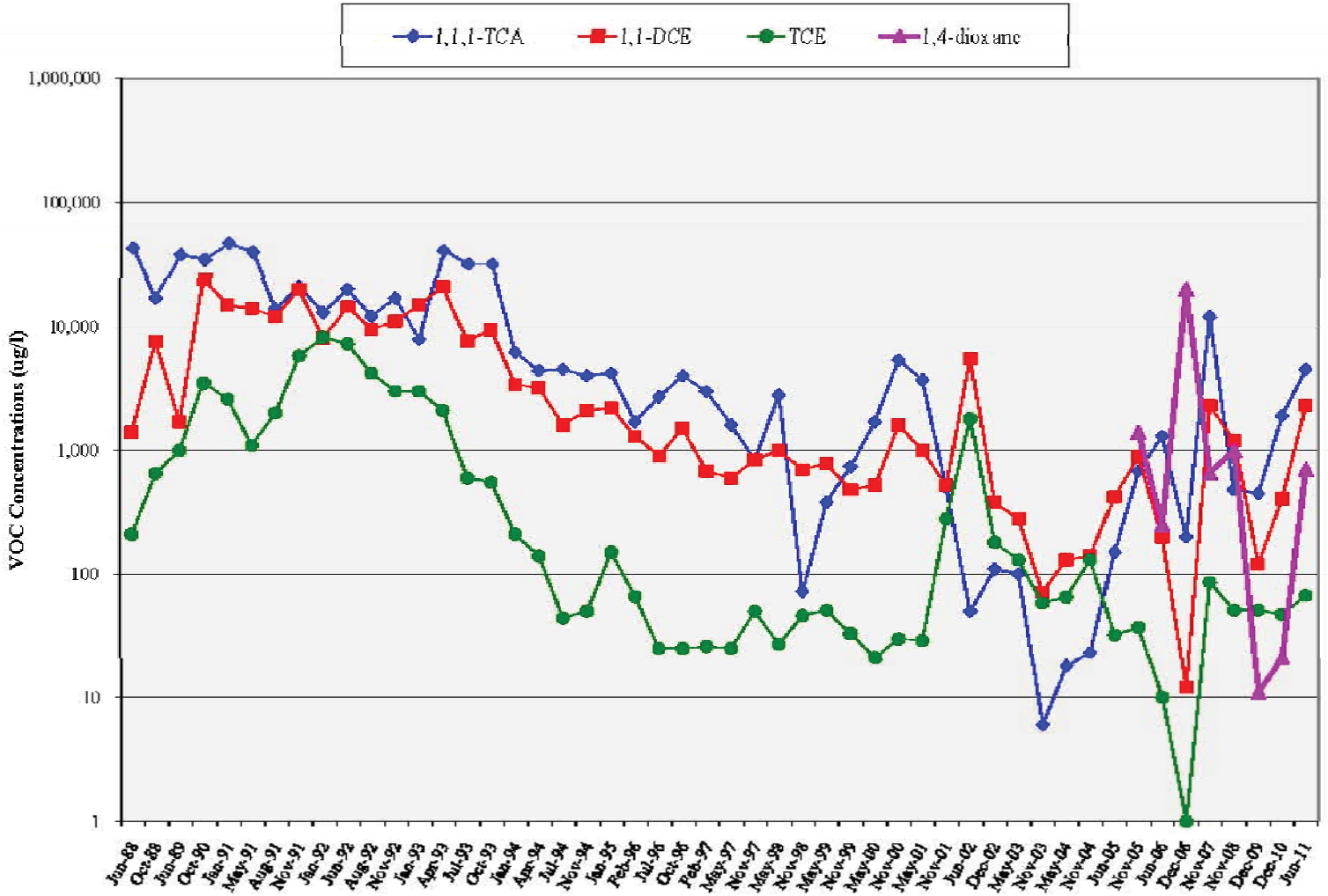


DTSC Data Request
Dye Tracer



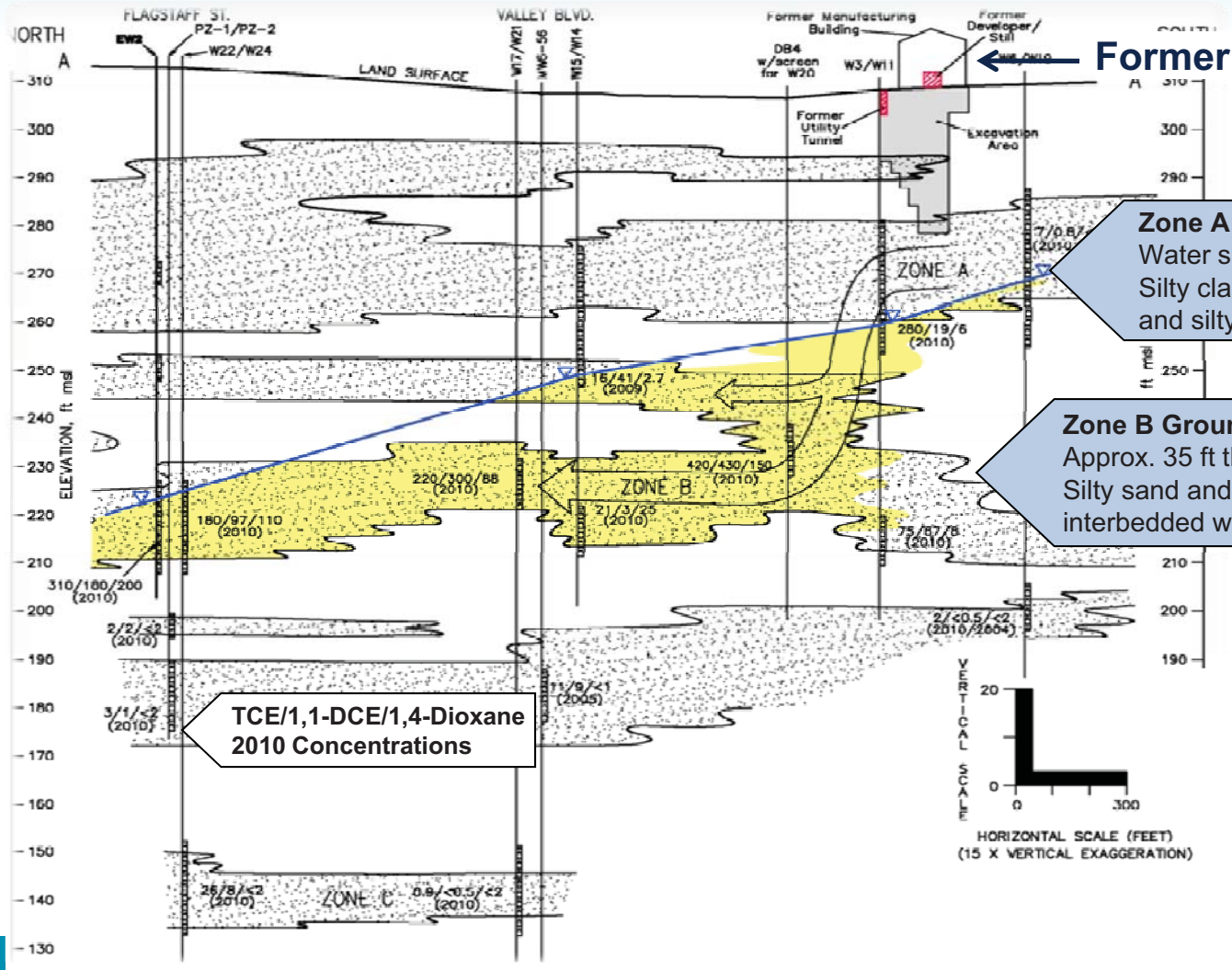


NORTHROP GRUMMAN	Former TRW Benchmark Site, City of Industry, CA	Project: BEN.06.11.037
	VOC Concentrations vs. Time - Well W3	FIGURE 8



NORTHROP GRUMMAN	Former TRW Benchmark Site, City of Industry, CA	Project: BEN 06.11.037
	VOC Concentrations vs. Time - Well W8	**FIGURE 9**

Site Conceptual Model
Generalized Geologic Cross Section



Former Benchmark Site

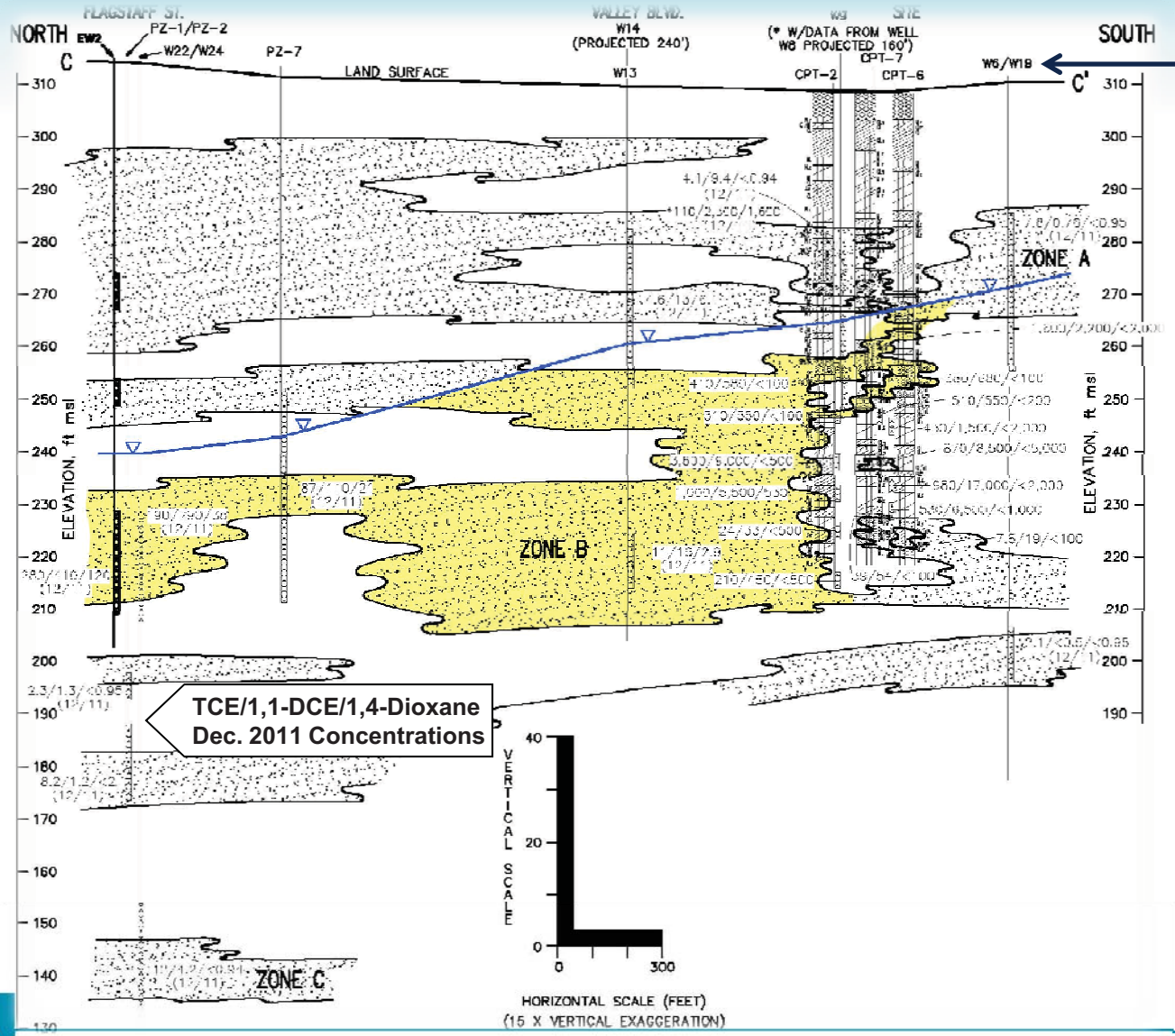
Zone A Groundwater
Water surface to 60 feet bgs
Silty clay interbedded with silt and silty sand (CL)

Zone B Groundwater
Approx. 35 ft thick
Silty sand and sand interbedded with clay (SM/CL)

TCE/1,1-DCE/1,4-Dioxane 2010 Concentrations

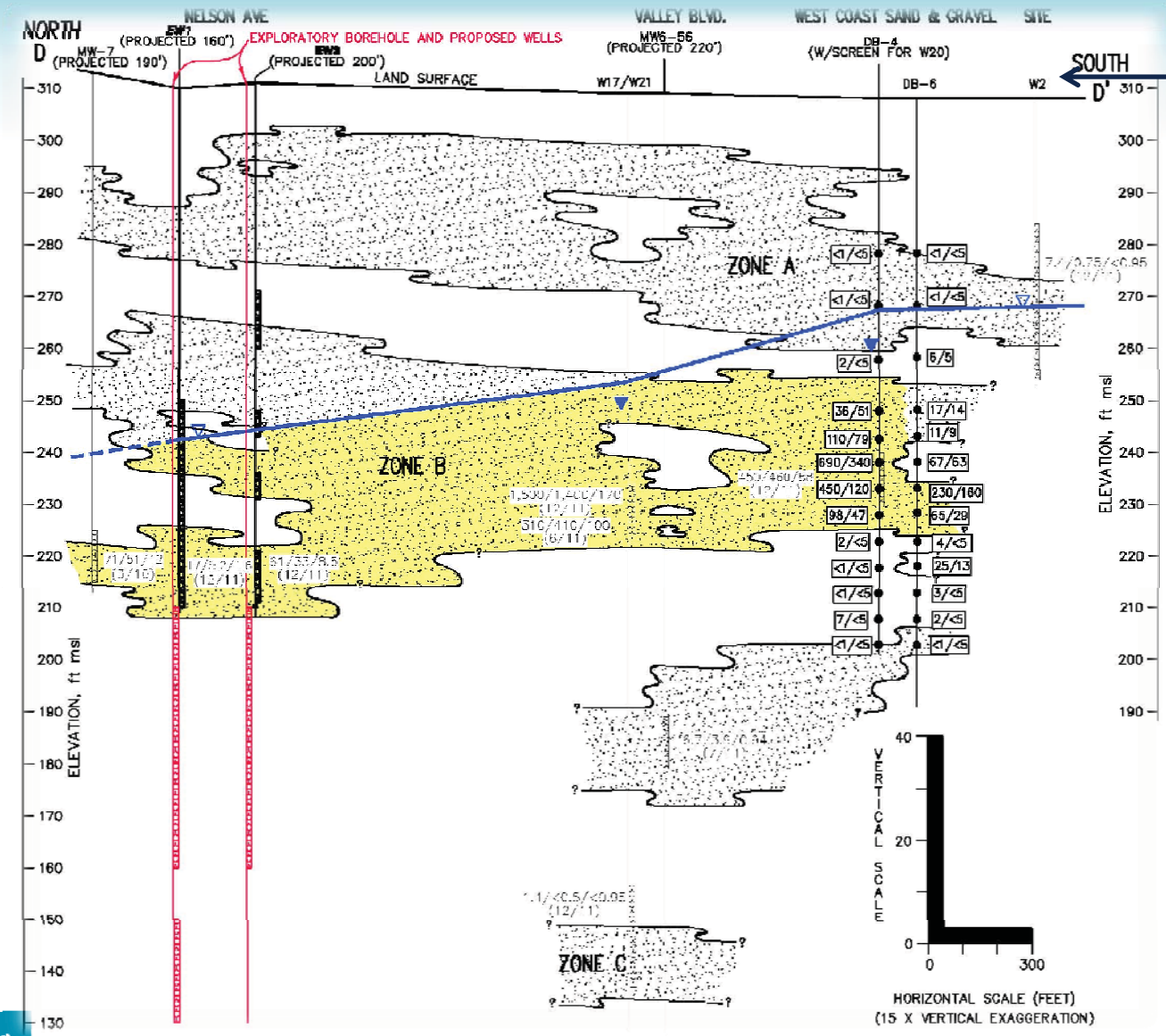
W20 / Acorn Engineering

Updated Geologic Cross Section
W6/W19 to W22/W24



Former TRW Benchmark Site

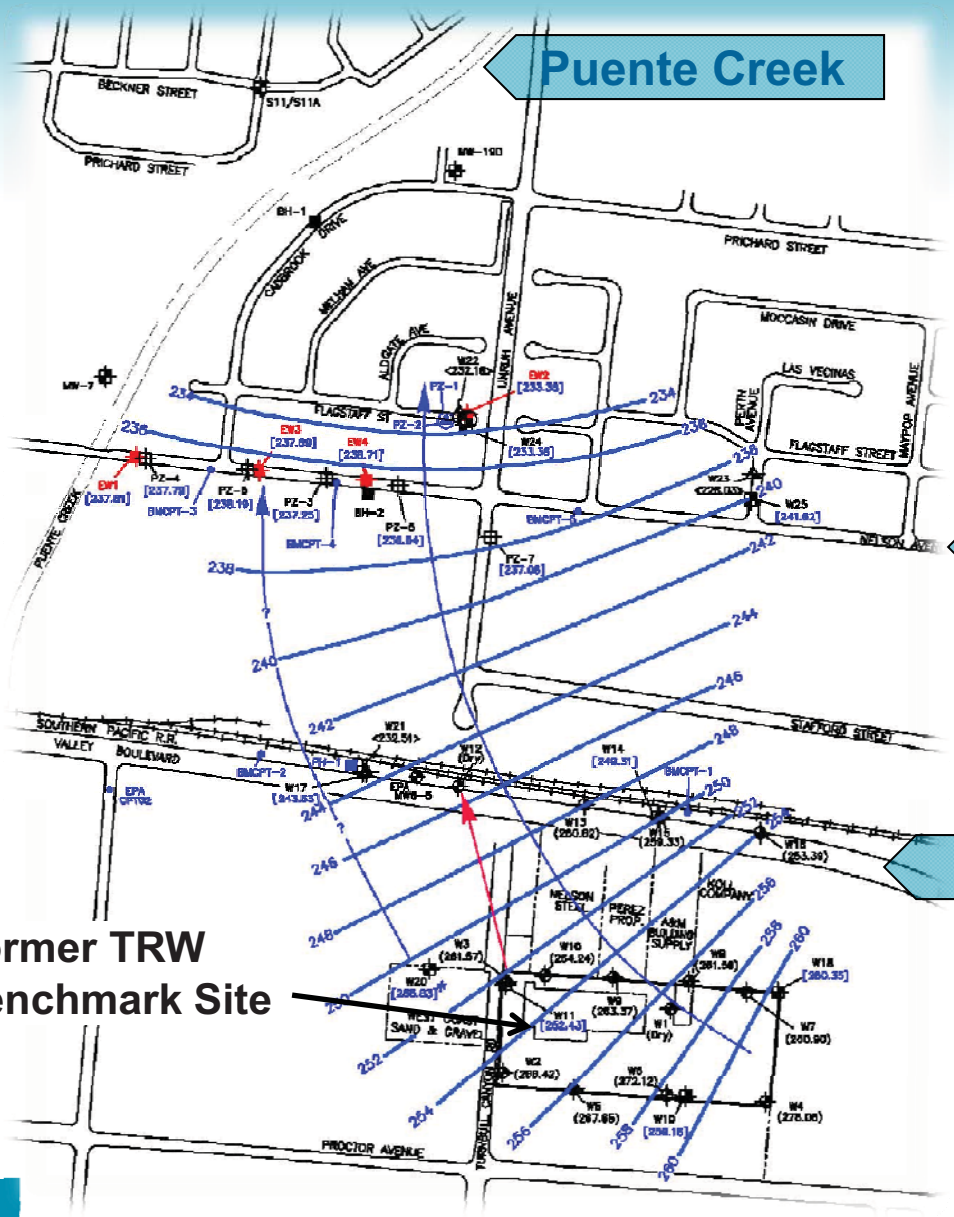
Updated Geologic Cross Section
W2 to MW-7



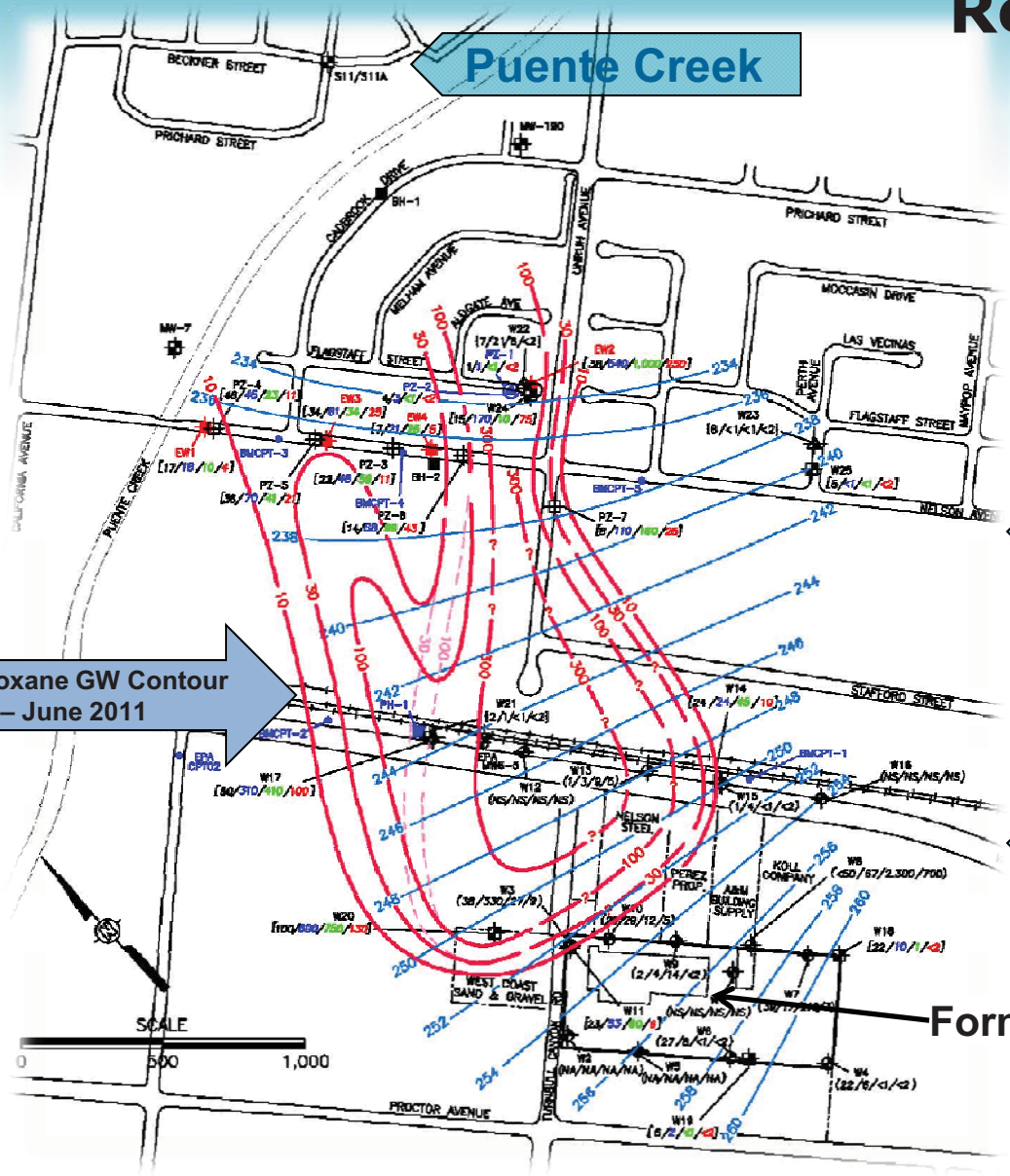
Former TRW Benchmark Site

TCE/1,1-DCE/1,4-Dioxane Dec. 2011 Concentrations

Potentiometric Surface Map
Zone B – June 2011

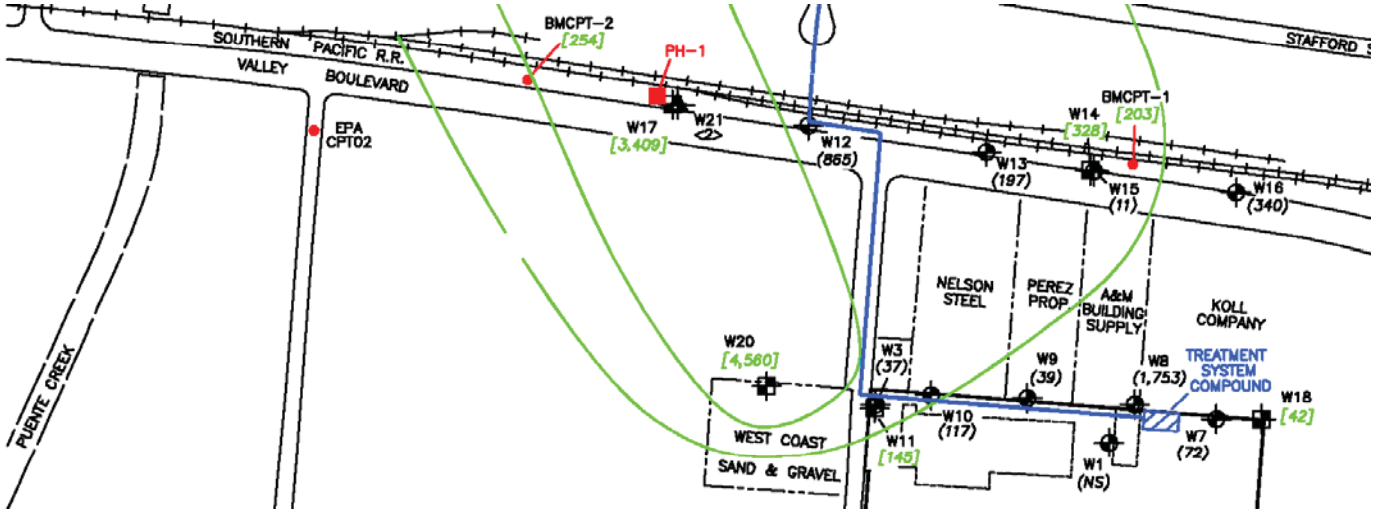


SZ-South Remedy Location



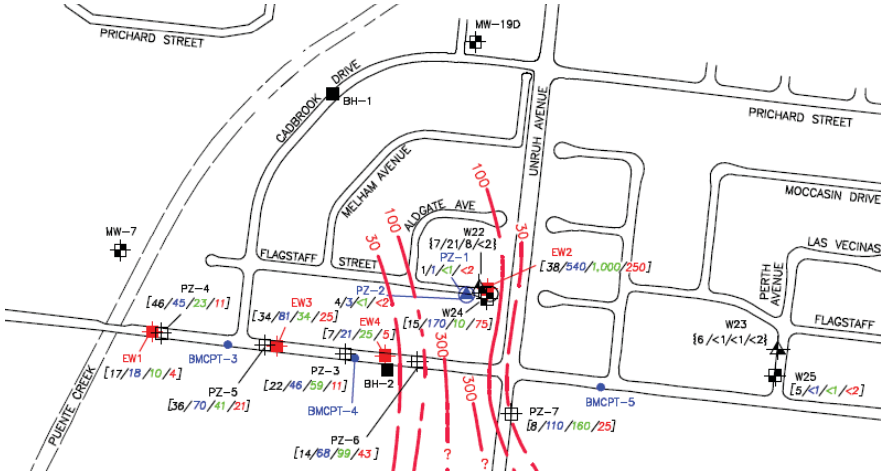
Valley Boulevard Investigation (2005)

- Drilled borings to confirm lithology and design extraction wells
- Verified extent of Benchmark plume along Valley Blvd
- Performed short-duration well yield tests and determined that wells along Valley Blvd. screened in impacted interval were not capable of sustaining GW extraction system (less than 5 gpm)



Vertical Assessment on Flagstaff (2006)

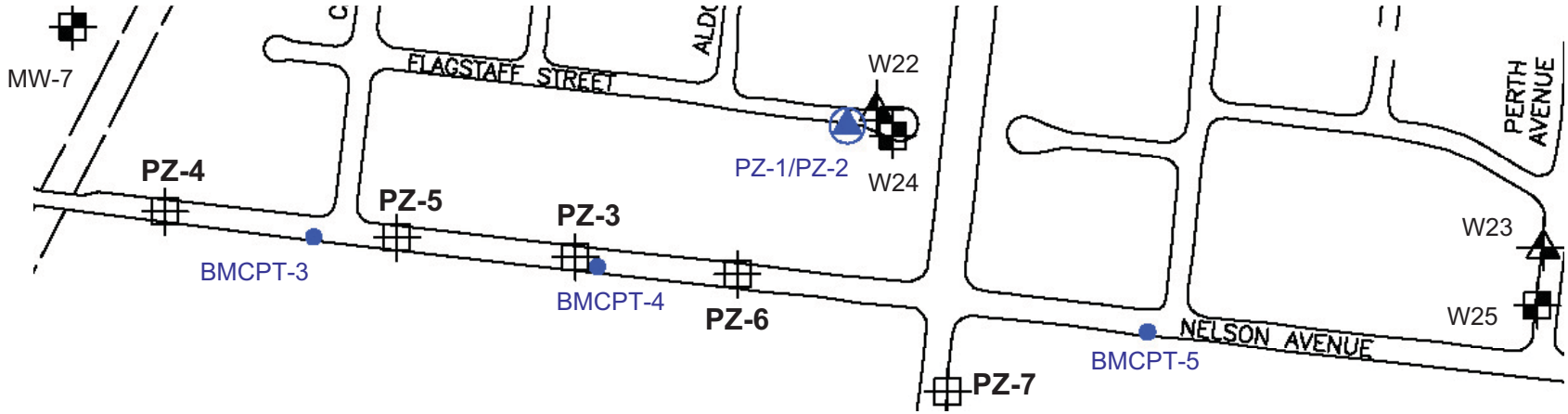
- Installed piezometers PZ-1 and PZ-2 in Flagstaff adjacent to wells W22 and W24 to delineate vertical impacts



Well	Screen Interval (feet)	TCE (ppb)	1,1-DCE (ppb)	1,4-Dioxane (ppb)
W24	85 to 105	250	400	110
PZ-1	116 to 121	1.9	1.7	ND<2
PZ-2	125 to 140	3.8	0.5	ND<2
W22	160 to 180	7.1	2.2	ND<2

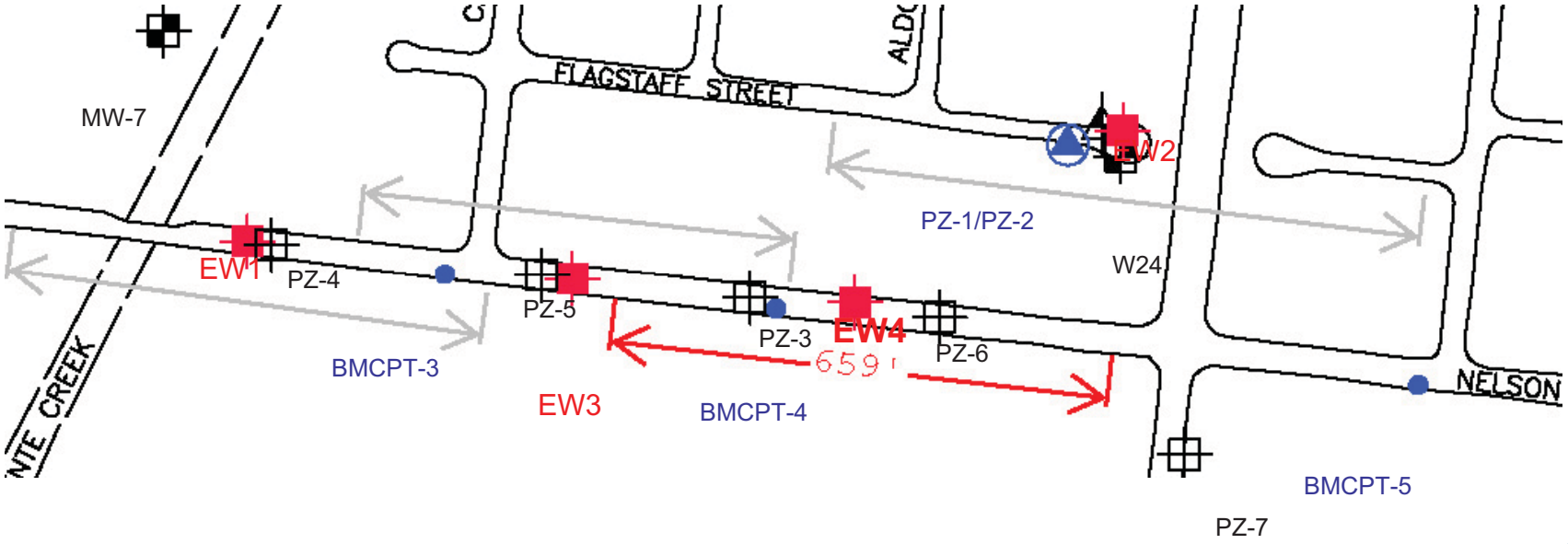
Nelson Ave. Investigation (2006)

Well / Boring	Sample Date	PCE (µg/l)	TCE (µg/l)	1,1,1-TCA (µg/l)	1,1-DCE (µg/l)	cis-1,2-DCE (µg/l)	trans-1,2-DCE (µg/l)	Vinyl Chloride (µg/l)	1,1-DCA (µg/l)	1,4-Dioxane (µg/l)
EPA MW-7	5/10/2006	85	120	ND<5	100	25	ND<5	ND<5	9	9
PZ-4	7/6/2006	43	24	ND<0.5	9	8	ND<0.5	ND<1	1	NA
BMCPT-3	3/27/2006	18	36	ND<0.5	36	13	ND<0.5	ND<1	5	15
PZ-5	7/21/2006	64	67	ND<0.5	55	13	ND<0.5	ND<0.5	4	16
PZ-3	6/8/2006	14	44	ND<0.5	50	3	ND<0.5	ND<0.5	4	28
BMCPT-4	3/27/2006	15	230	1	540	32	1	ND<1	74	200
PZ-6	7/21/2006	30	130	2	160	11	ND<0.5	ND<0.5	17	46
W24	12/13/2006	16	250	ND<2.5	430	8.2	ND<2.5	ND<5	36	110
PZ-7	7/21/2006	11	190	ND<0.5	360	4	ND<0.5	ND<0.5	17	59
BMCPT-5	3/28/2006	1	5	ND<0.5	8	ND<0.5	ND<0.5	ND<1	1	ND<3.5
W25	6/8/2006	12	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2

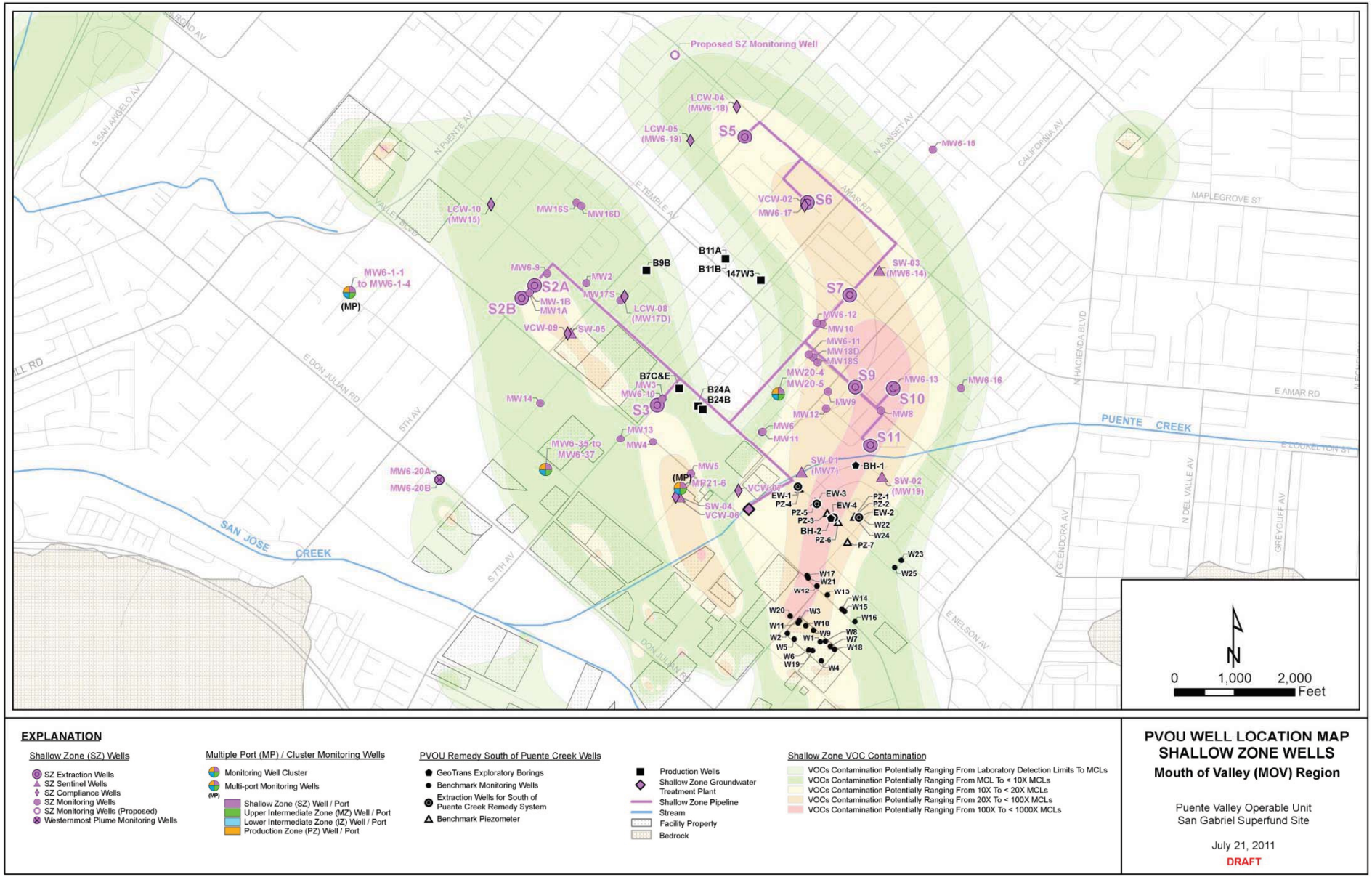


Extraction Well Installation

- Step-drawdown Tests
  - EW1 – 60 gpm
  - EW2 – 80 gpm
  - EW3 – 40 gpm
  - EW4 – 20 gpm



SZ CVOCs



EXPLANATION

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Shallow Zone VOC Contamination
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PVOU WELL LOCATION MAP
SHALLOW ZONE WELLS
Mouth of Valley (MOV) Region

Puente Valley Operable Unit
San Gabriel Superfund Site

July 21, 2011
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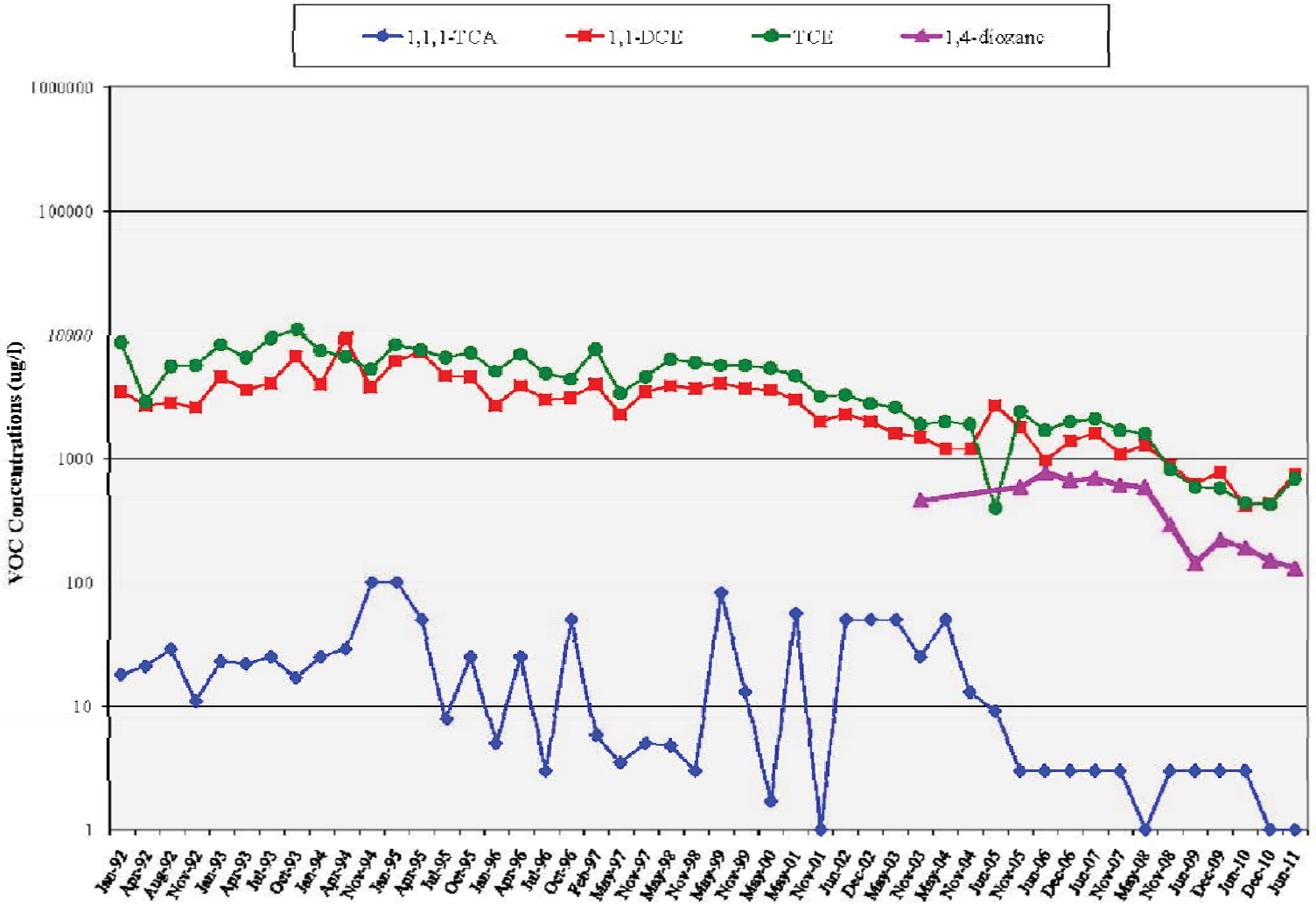
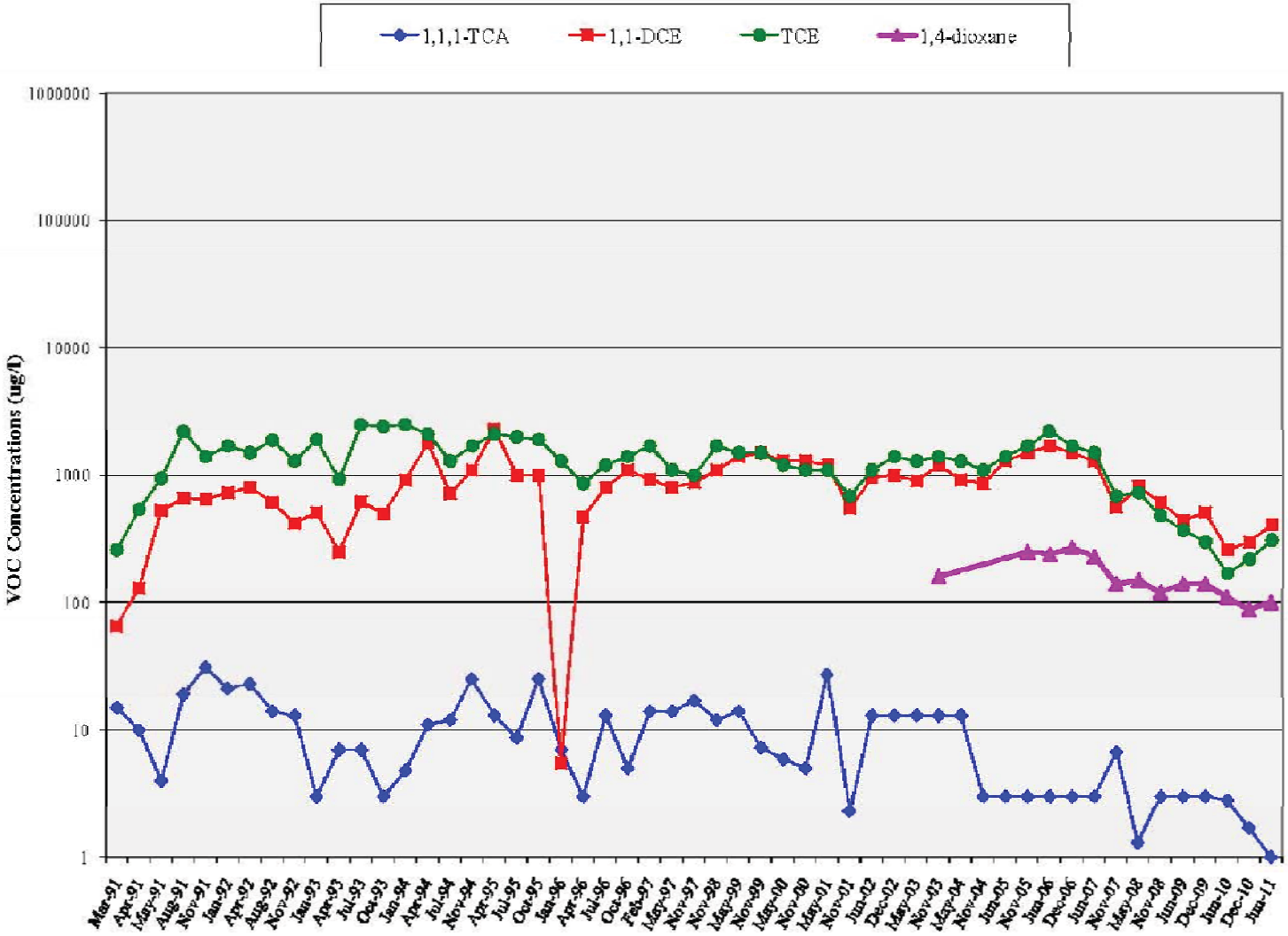
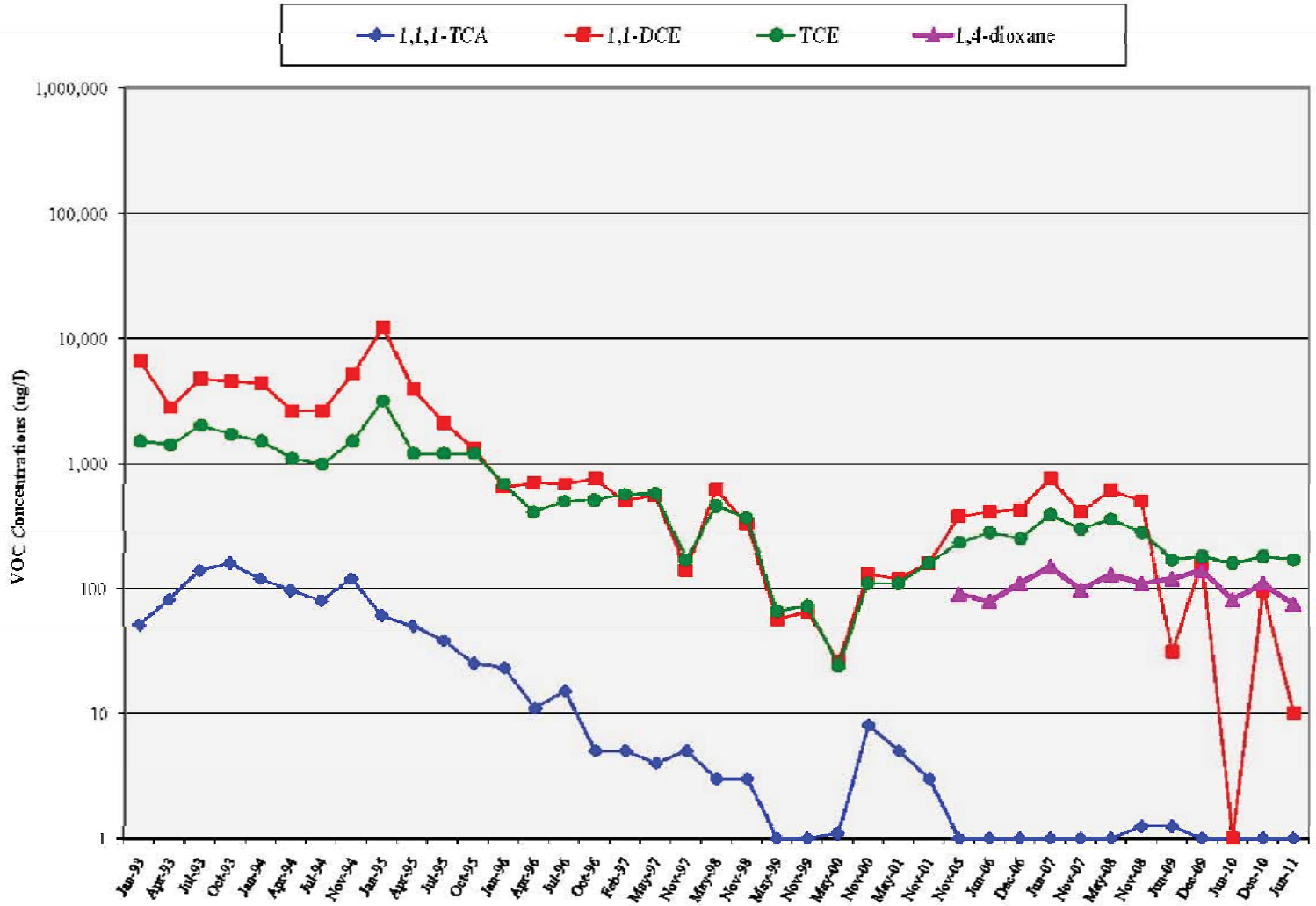


NORTHROP GRUMMAN	Former TRW Benchmark Site, City of Industry, CA	Project: BEN.06.11.037
	VOC Concentrations vs. Time - Well 20	FIGURE 14



NORTHROP GRUMMAN	Former TRW Benchmark Site, City of Industry, CA	Project: BEN.06.11.037
	VOC Concentrations vs. Time - Well W17	FIGURE 13



NORTHROP GRUMMAN	Former TRW Benchmark Site, City of Industry, CA	Project: BEN.06.11.037
	VOC Concentrations vs. Time - Well W24	**FIGURE 15**

Remedial Design Investigation (RDI)

- Problem Statement
  - Previous releases have resulted in the presence of VOC contamination in groundwater in the PVOU. There is concern that some of the VOC contamination exceeding 10X MCLs may be migrating in the SZ-South at depths greater than the screened intervals of extraction wells installed at Nelson Avenue (from the QAPP appended to the RDI Work Plan).

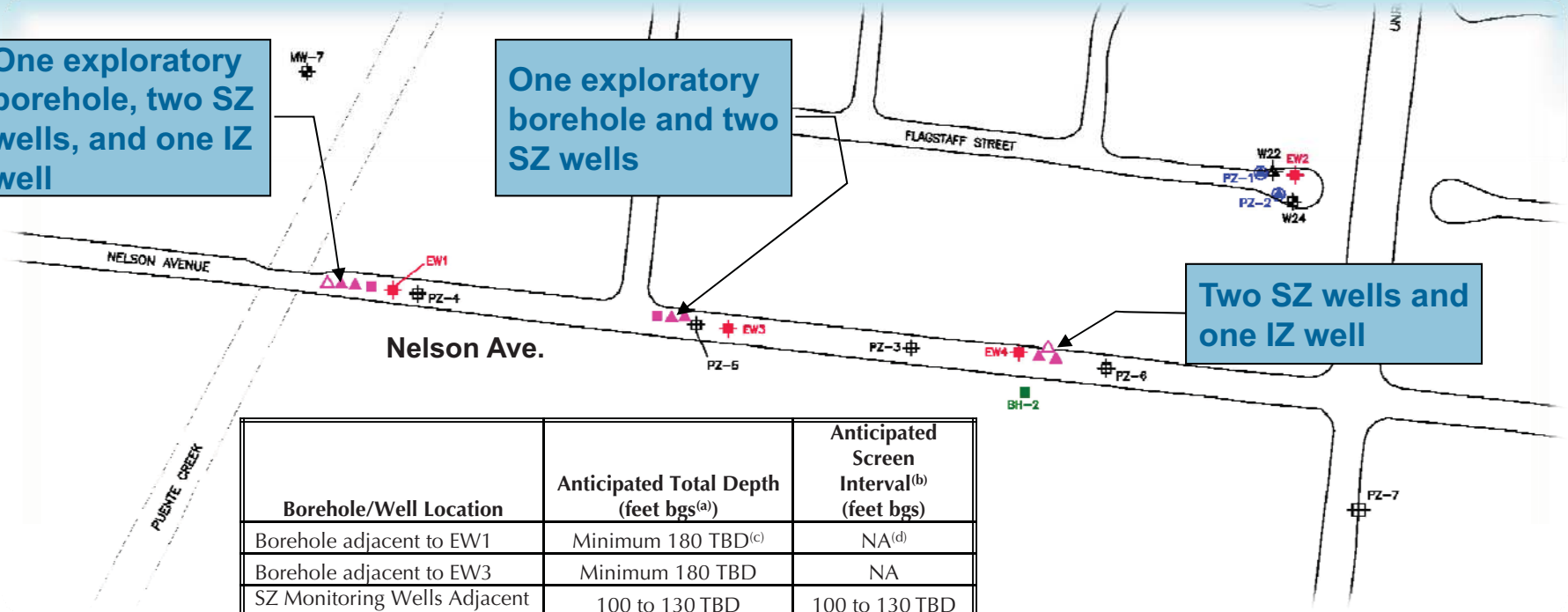
- Principle study question
  - The data will be used to (1) evaluate whether VOCs originating from the Benchmark site are migrating in the PVOU SZ at depths below the screened intervals of the Nelson Avenue extraction wells at concentrations exceeding 10X the MCLs and, if so, (2) design and implement an extraction well network capable of providing hydraulic containment of this deeper impacted groundwater (from the QAPP appended to the RDI Work Plan).

RDI Borehole and Well Locations

One exploratory borehole, two SZ wells, and one IZ well

One exploratory borehole and two SZ wells

Two SZ wells and one IZ well



Borehole/Well Location	Anticipated Total Depth (feet bgs[a])	Anticipated Screen Interval[b] (feet bgs)
Borehole adjacent to EW1	Minimum 180 TBD[c]	NA[d]
Borehole adjacent to EW3	Minimum 180 TBD	NA
SZ Monitoring Wells Adjacent to EW1	100 to 130 TBD	100 to 130 TBD
	130 to 150 TBD	130 to 150 TBD
Upper IZ Monitoring Well Adjacent to EW1	Minimum 180 TBD	TBD
SZ Monitoring Wells Adjacent to EW3	100 to 130 TBD	100 to 130 TBD
	130 to 150 TBD	130 to 150 TBD
SZ Monitoring Wells Adjacent to UTC Boring BH-2	123	103 to 123
	152	132 to 152
Upper IZ Monitoring Well Adjacent to UTC Boring BH-2	185	165 to 185

(a) bgs - Below ground surface.
(b) Each screen interval is anticipated to be 10 to 20 feet.
(c) TBD - To be determined
(d) NA - Not applicable

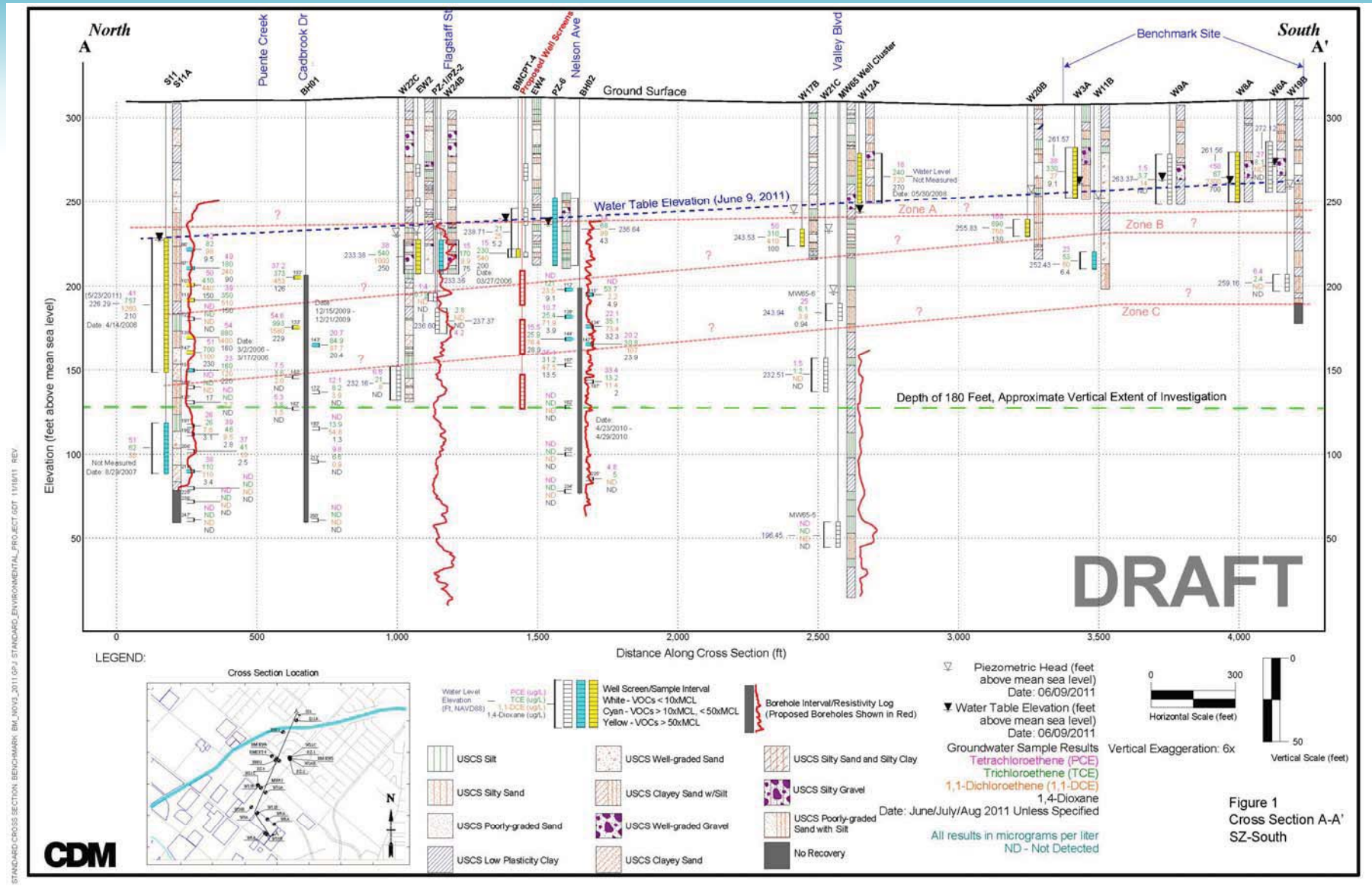
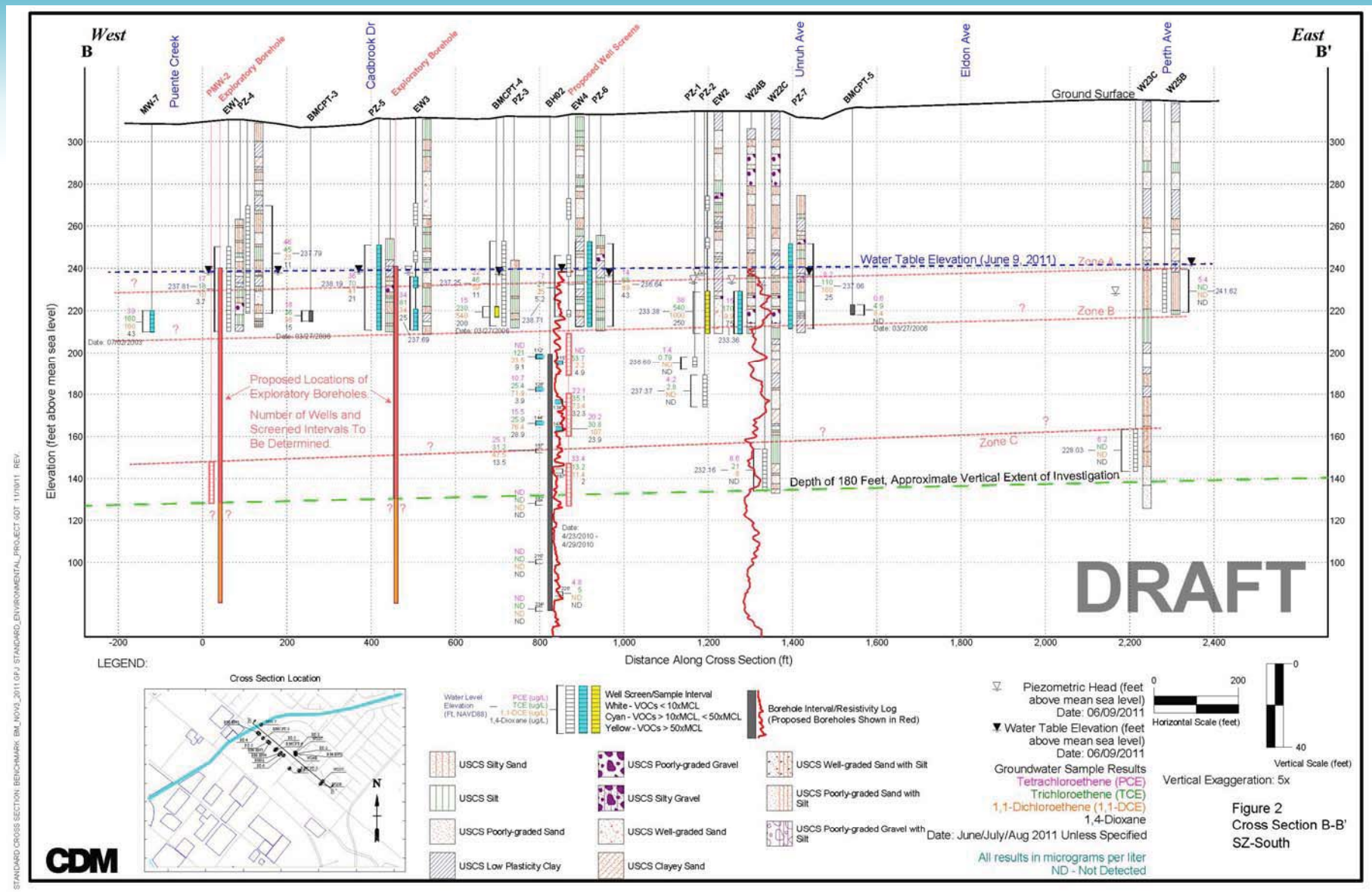


Figure 1
Cross Section A-A'
SZ-South


West
B
East
B'
Puente Creek
Cadbrook Dr
Unruh Ave
Eldon Ave
Perth Ave
MW-7
PMW-2
Exploratory Borehole
EW1
PZ-4
BMCPT-3
PZ-5
Exploratory Borehole
EW3
BMCPT-4
PZ-3
BH02
Proposed Well Screens
EW4
PZ-6
PZ-1
PZ-2
EW2
W24B
W22C
PZ-7
BMCPT-5
Ground Surface
W23C
W25B
Water Table Elevation (June 9, 2011)
Zone A
Zone B
Zone C
Proposed Locations of Exploratory Boreholes
Number of Wells and Screened Intervals To Be Determined
Depth of 180 Feet, Approximate Vertical Extent of Investigation
Elevation (feet above mean sea level)
Distance Along Cross Section (ft)
DRAFT
LEGEND:
Cross Section Location
Well Screen/Sample Interval
White - VOCs < 10xMCL
Cyan - VOCs > 10xMCL, < 50xMCL
Yellow - VOCs > 50xMCL
Borehole Interval/Resistivity Log
(Proposed Boreholes Shown in Red)
USCS Silty Sand
USCS Silt
USCS Poorly-graded Sand
USCS Low Plasticity Clay
USCS Poorly-graded Gravel
USCS Silty Gravel
USCS Well-graded Sand
USCS Clayey Sand
USCS Well-graded Sand with Silt
USCS Poorly-graded Sand with Silt
USCS Poorly-graded Gravel with Silt
Piezometric Head (feet above mean sea level)
Date: 06/09/2011
Water Table Elevation (feet above mean sea level)
Date: 06/09/2011
Groundwater Sample Results
Tetrachloroethene (PCE)
Trichloroethene (TCE)
1,1-Dichloroethene (1,1-DCE)
1,4-Dioxane
Date: June/July/Aug 2011 Unless Specified
All results in micrograms per liter
ND - Not Detected
Horizontal Scale (feet)
Vertical Scale (feet)
Vertical Exaggeration: 5x
Figure 2
Cross Section B-B'
SZ-South
CDM

END